Journal

OF THE

AMERICAN VETERINARY MEDICAL ASSOCIATION

Spontaneous Atherosclerosis of Swine

SPONTANEOUS atherosclerotic lesions similar to those in man were found in 45 normal, apparently healthy swine. Page 65

Eastern Equine Encephalitis in Maryland

LABORATORY and clinical findings on 17 fatal cases of equine encephalitis in horses and ponies are reviewed. Page 661

Pulmonary Emphysema in Cattle

ACUTE bovine pulmonary emphysema, now one of the most important respiratory diseases of cattle, appears to be increasing in the western states. Page 669

Evaluation of Surgery for Canine Heartworms

THIS report was made to record experiences with surgery for the treatment of heartworm infection in dogs. Page 684

Vol. 139 September 15, 1961 No. 6

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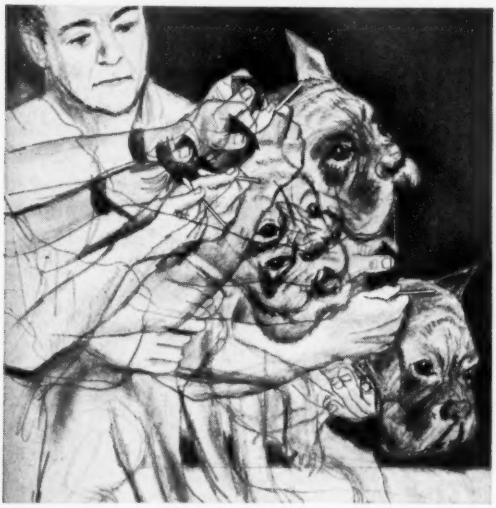

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OF THE
AMERICAN VETERINARY
MEDICAL ASSOCIATION

Vol. 139 No. 6 September 15, 1961

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Correspondence

Personalized Veterinary Service

July 30, 1961

Dear Sir:

Congratulations on your editorial referring to Personalized Veterinary Service that appeared in the July 15 JOURNAL. It is very refreshing to read an editorial of this type in spite of the "trends" in large animal practice here in the East. I have felt and will feel that personalized veterinary service is a *must* if we are to accept our repsonsibilities and render an adequate service to the livestock owner. I shall always feel that this service is basic.

s/NIEL W. PIEPER, D.V.M.
Middleton, Conn.

Encyclopedia of Medical Radiology

July 20, 1961

Dear Sir:

I have recently completed a Chapter on the subject of "Radiation Therapy of Animals" for the *Encyclopedia of Medical Radiology* which is being published by Springer in Germany under the editorship of Professor O. Olsson, Lund, Sweden: Professor F. Strnad, Frankfurt; Professor H. Vieten, Duesseldorf; and Professor A. Zuppinger, Bern. The work has been written in German and will comprise about 50 pages including the illustrations, the table of contents, and the literature.

This chapter was prepared in order to familiarize the human radiologist with the present status of radiation therapy of animals. The outline is entirely devoted to the problem of treatment of animals as patients with any form of ionizing rays.

I wish to express my appreciation to the American Veterinary Medical Association and its staff for the assistance without which I could never have undertaken this task.

I hope that this publication will help to foster and encourage a closer relationship between the human and veterinary radiologists. In this regard it might be of interest to you that the president of the first meeting of the German Roentgen Society in Berlin in 1905 was a professor of veterinary surgery of the Veterinary Medical School of the University of Berlin.

Sincerely yours,
s/EUGENE F. LUTTERBECK, M.D.
Chicago, Ill.

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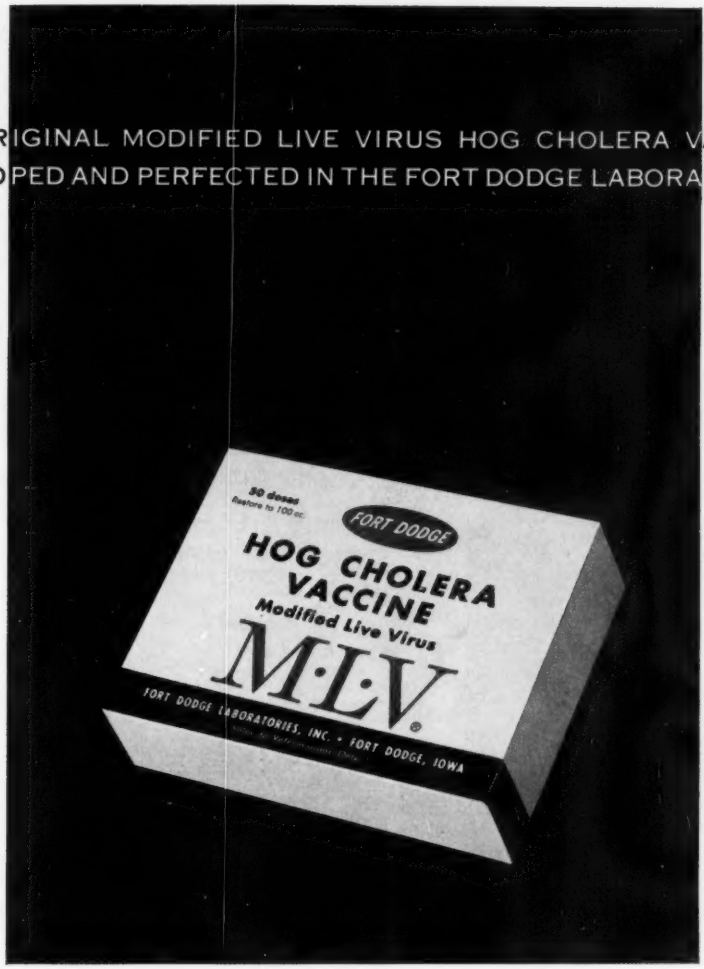

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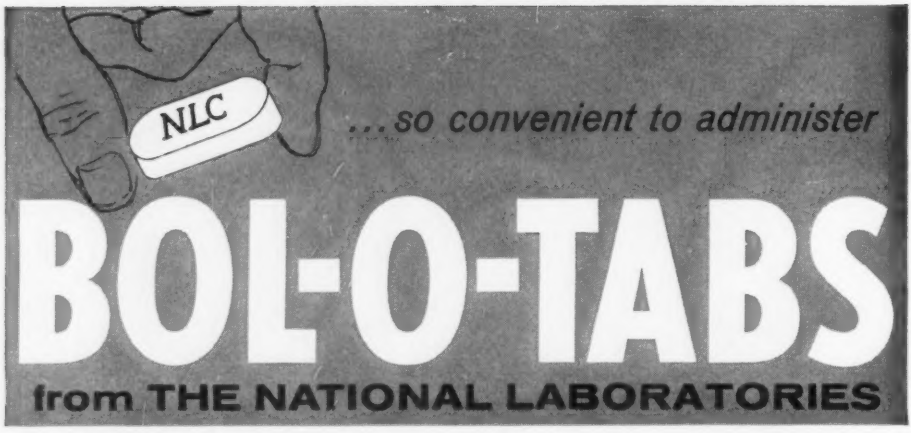

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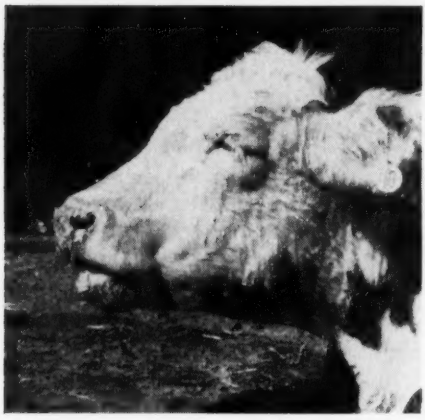

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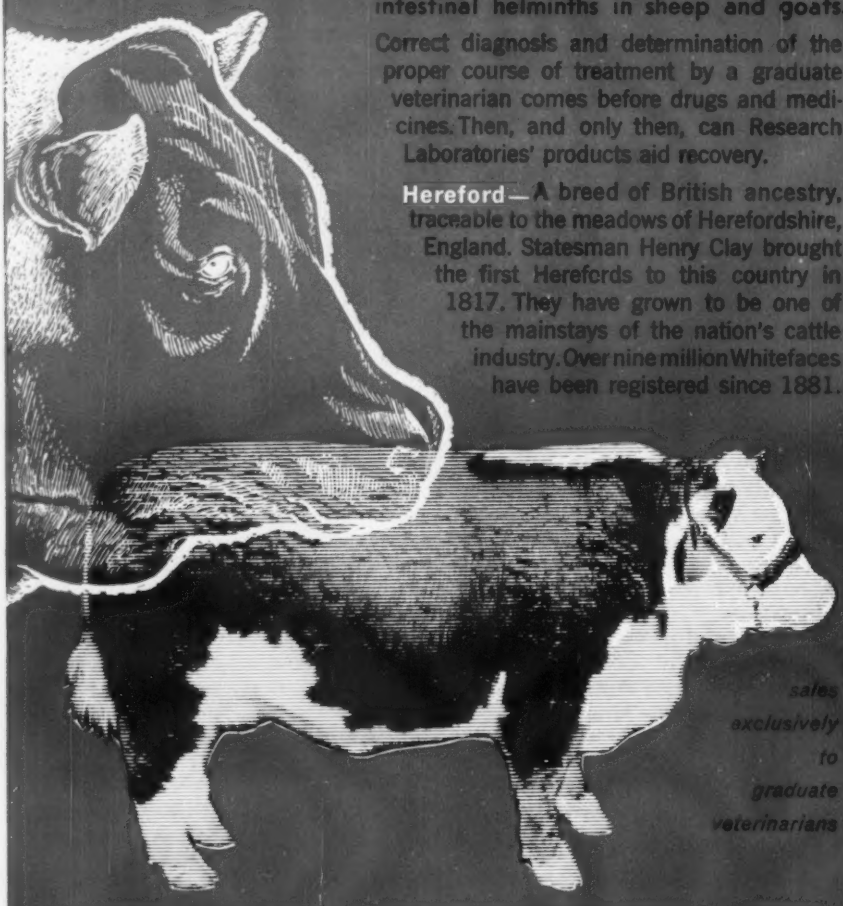

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news from Washington . . .

FROM THE AVMA WASHINGTON OFFICE
J. A. McCallam, VMD
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MISCELLANEOUS

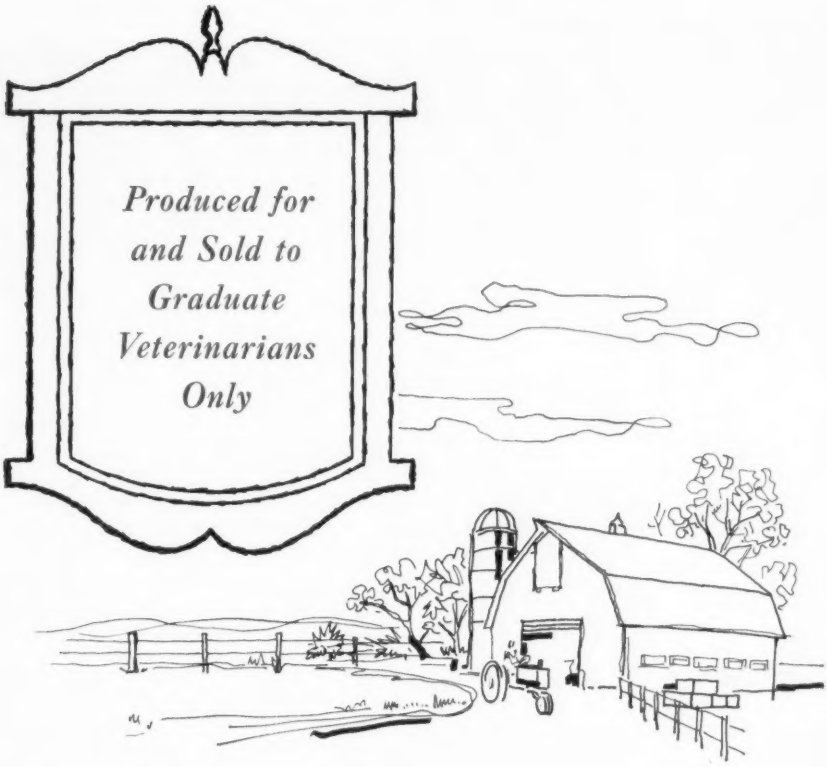
Veterinary Research Report In a press release, Aug. 13, 1961, Sen. Humphrey (D., Minn.) urged increased veterinary medical research to solve health problems common to man and animals. The Committee Print, *Veterinary Medical Science and Human Health*, officially released at the same time, is a concise 244-page treatise on veterinary medical research, prepared for the Senate Committee on Government Operations and its Subcommittee on Reorganization and International Organizations. Sen. Humphrey is chairman of the Subcommittee. It is the 11th in a series of publications issued by this Subcommittee as a part of its international health study. Part of Chairman Humphrey's official statement read, "This study is probably the first of its kind ever issued by a committee of the Congress. It is a Government-wide review of the relationship of veterinary medical science to human health. As such, it is of deep significance to the well-being of every citizen of our land, as well as peoples throughout the world —a layman might think of veterinary medicine as a matter of interest 'only to the farmer' for example, or 'only to the owner of a household pet.' Actually, veterinary medical science is part and parcel of biology and medical science as a whole. The history of man's battle against disease is rich with illustrations of that fact."

This Committee Print can be obtained for 65 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., or constituents might request their Senator to obtain a copy from the Committee for them for "official" use.

More Veterinary Officers It is anticipated that a modest additional requirement for veterinary officers (besides replacements needed for those who would normally complete two years of active duty) will result from increases in the Armed Forces due to the critical international situation. If so, the first increment may expect to be on active duty in January, 1962.

Science Information Exchange Stella Leche Deigman, who, as director of Science Information Exchange, developed an excellent clearinghouse of information on biomedical research, will leave to take an

(Continued on page 626)



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executive position in the international research division of National Institutes of Health. She will be succeeded at SIE by Col. Monroe Freeman, presently attached to Advanced Research Projects (ARPA) in the Defense Department.

LEGISLATION

Civil Service Annuities

Public Law 87-114 (H.R. 5432)—Makes permanent certain increases in annuities payable from civil service retirement and disability fund, provided by *P.L. 85-465 (1958)*.

Agricultural Act

Public Law 87-128 (S. 1643)—Agricultural Act of 1961, designed to protect farm prices and income, increase farmer participation in farm programs, adjust supplies of agricultural commodities, improve distribution, and expand exports, among other things; approved Aug. 8, 1961.

Duty-Free Allowance

Public Law 87-132 (H.R. 6611)—Reduces from $500.00 to $100.00 the duty-free allowance permitted returning resident travelers.

Department of Agriculture Centennial

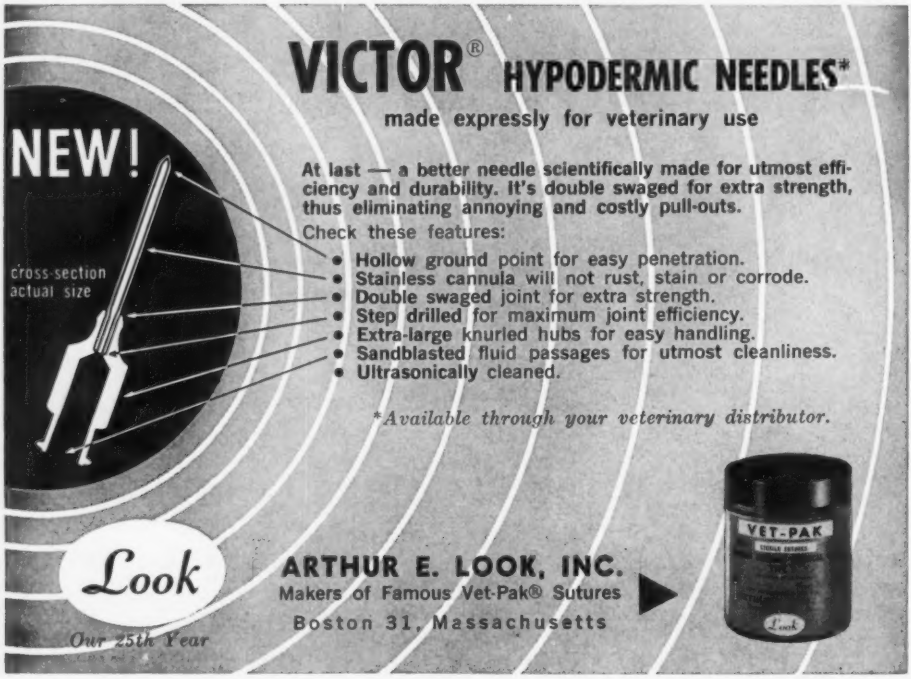
H. J. Res. 435—To provide for recognition of the centennial of the establishment of the Department of Agriculture. Cleared for the President.

Land-Grant System Centennial

H.J. Res. 436—To provide for recognition of the centennial of the establishment of the national system of land-grant universities and colleges. Cleared for the President.

Travel Allowance Equalization

H.R. 4786—To equalize travel allowances for Reserve and National Guard personnel. Cleared for the President.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NEWS

Dr. Dan J. Anderson Elected AVMA President-Elect

Dr. Dan J. Anderson

Dr. Dan J. Anderson (TEX '38) has been elected president-elect of the American Veterinary Medical Association. He was installed in his new office August 23, at the AVMA convention in Detroit.

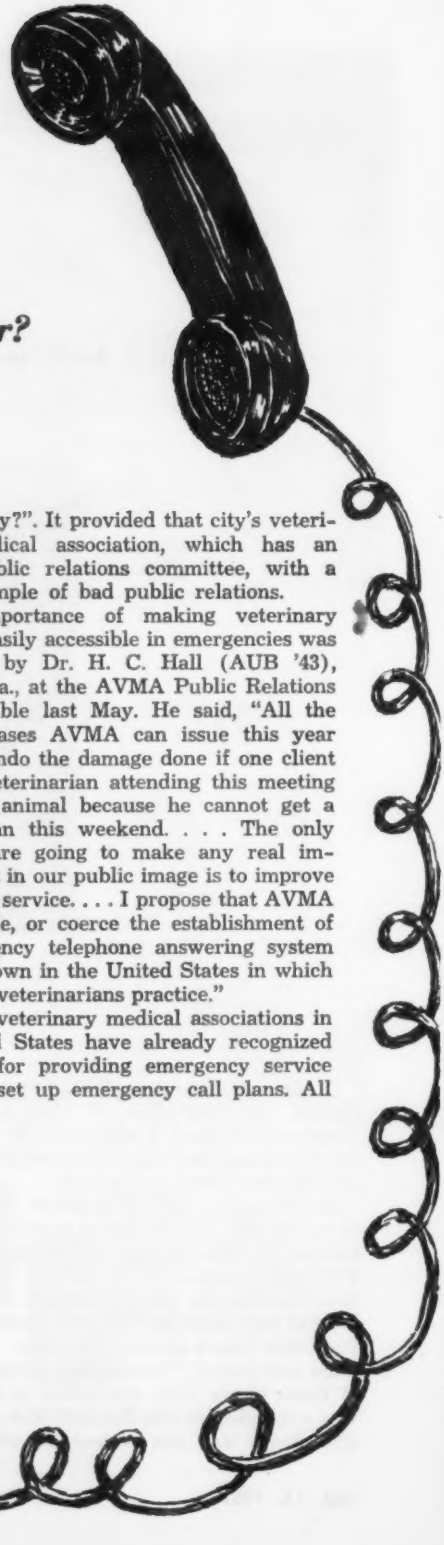
Dr. Anderson has a long record of service to the AVMA and the entire veterinary profession. He was elected to serve as District VIII representative to the AVMA Executive Board in 1956. He was chairman of the Board in 1958 and again in 1960. His term on the Executive Board expired this year.

He was named "Outstanding Practitioner" of Texas by the state association in 1954. He was a member of the Texas V.M.A. Executive Board and has served as veterinary advisor to the Southern Regional Education Board.

Following graduation, Dr. Anderson entered practice in San Antonio, Texas, served as animal pathologist for the Ralston Purina Company for a short time, and then returned to practice in Terrill, Texas. He entered the U.S. Army Veterinary Corps from which he was discharged in 1945 with the rank of captain. He is now a major in the Veterinary Corps Reserve. He was state veterinarian of Texas in 1945-1946 and then returned to general practice in Fort Worth, Texas.

Dr. Anderson will take office as AVMA president at the next AVMA annual convention in Miami Beach, Fla.

What About Emergencies, Doctor?



"A north side boy took his dog for a walk the other morning. The dog darted into a street and was hit by a car.

"The boy's father phoned several veterinarians' offices. He could find none open at 7 a.m. so he called the police. The policemen thought the dog's life could be saved by a veterinarian, but they couldn't find one either. So while the boy watched, they destroyed his dog. Why?"

This attack against veterinarians appeared in a commentary column of a large metropolitan newspaper with a daily circulation of approximately 540,000.

It demanded an answer to the question "Why haven't the veterinarians of this large city set up a system so that a veterinarian can be reached to care for animals that are victims of such accidents?" The reporter was clever. To put this question before the public, he told of an incident that couldn't help but reach the hearts of most people — the story of a boy and his dog.

His question was valid. Undoubtedly everyone who read the article wanted to know "why?". It provided that city's veterinary medical association, which has an active public relations committee, with a vivid example of bad public relations.

The importance of making veterinary services easily accessible in emergencies was discussed by Dr. H. C. Hall (AUB '43), Tampa, Fla., at the AVMA Public Relations Round Table last May. He said, "All the news releases AVMA can issue this year will not undo the damage done if one client of each veterinarian attending this meeting loses one animal because he cannot get a veterinarian this weekend. . . . The only way we are going to make any real improvement in our public image is to improve our public service. . . . I propose that AVMA urge, cajole, or coerce the establishment of an emergency telephone answering system in every town in the United States in which 2 or more veterinarians practice."

Several veterinary medical associations in the United States have already recognized the need for providing emergency service and have set up emergency call plans. All

of these programs have a twofold purpose —to provide veterinary service after office hours for those who cannot reach their own veterinarian or who do not have a veterinarian; and to give individual veterinarians some free time by assuring that their clients will be provided for in case of emergency.

All of the plans have been set up to fill specific community needs. They differ slightly, but basically here's how they've been planned.

Once a local veterinary medical association decides to establish an emergency call system in the community, the next step is to let the public know about it. An emergency plan will be of little value if the public doesn't know one exists or cannot locate the emergency phone number.

Associations have found it works best to get an emergency call number and refer emergencies to the veterinarian on duty through it. They have, in most cases, listed the emergency call number in a box on the yellow pages of telephone directories. Other methods of getting the emergency number before the public are through advertising and features in local newspapers, postcard promotions, spot announcements on radio and television, or leaflets and blotters for clients.

Associations differ in methods of taking and referring emergency calls. Some list as the emergency call number the number of a secretarial answering service. The answering service refers callers to the veterinarian on emergency duty. Others list as the call number the number of an association officer. After hours, a special telephone hook-up device plays a tape when calls come in, giving the name and telephone number of the veterinarian on duty. One association that has a close relationship with the local medical society uses the medical society emergency switchboard to take and refer emergency calls.

In most cases, emergency service is provided from closing hours in evenings to opening hours in the morning, on weekends, and on holidays. Veterinarians serve on rotation basis. Some associations ask them to serve for 1 night at a time, others for 1 or 2 weeks at a time. In some plans, veterinarians volunteer to be a part of the emergency call system; in others, emergency duty is assigned to all association members. Veterinarians are informed of the times they are expected to be on call by a roster prepared and distributed by the veterinary medical association.

Emergency calls are handled only after it has been ascertained that the callers have tried to reach their own veterinarian and have been unable to do so. If emergency treatment is given, the client is referred back to his own veterinarian, and a report on services rendered is sent to that veterinarian by the doctor who handled the emergency.

A specific emergency service charge has been set by some associations, while others prefer to leave fee setting to the discretion of the doctor on emergency duty.

In large metropolitan areas or in counties that cover a large territory, associations have divided coverage into sections. The Southern California V.M.A., for example, has allotted the coverage to 12 sections with a separate rotating duty roster for each section. In this way people in all parts of southern California are assured of receiving emergency veterinary service from a veterinarian within their vicinity.

Some associations have found it advisable to discourage house calls or calls to farms. This takes the veterinarian on duty away from his office and keeps him from handling other emergency calls that may come in during this time. One group has solved this problem by having a large animal practitioner as well as a small animal practitioner on duty at all times.

The cost of maintaining emergency call programs varies with the size and intensity of the program. Associations have reported costs ranging from $340 to $5,000 per year. Usually the association sponsoring the program pays the bill. But, in some cases, veterinarians participating in the plan split the cost.

There are, of course, some veterinarians who prefer to handle emergency service on an individual practice basis. This can be effective if emergency service is available at all times to all people who need it and contact the doctor operating the practice. Often veterinarians who maintain this type of service within their practice also participate in the association emergency call system to assure complete coverage.

They know that one animal that is lost because a veterinarian could not be located, one emergency call that is left untended, is a reflection upon the entire veterinary profession. And, as the columnist did, people going to ask "Why?".

AVMA Style Guide Available

The AVMA Style Guide, first published in 1955 and reprinted in 1957, is now superseded by the 1961 edition.

Prepared by the editorial staff and approved by the Executive Board for free distribution as a membership service, the Guide has been sent to veterinary school faculties, government agencies, veterinary science departments, and other chief sources of manuscripts, and will be sent to members on request.

The Guide is intended to be helpful to veterinarians faced with the task of preparing manuscripts not only for AVMA Journals but for other publications as well.

A section of the Guide lists the general requirements of manuscript preparation, suggests methods of organizing the manuscript, and tells how to deal with titles, footnotes, illustrations, references, summaries, and tables. Under the general heading of style, there are guides for the preferred use of capital letters, symbols, italics, abbreviations, plural forms, genus and species names, and technical terms. There are instructions for galley proofreading and two pages of proofreaders' marks and explanations.

Requests should be sent to the American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill.

Dr. R. L. Kitchell Presents Paper at International Meeting

Dr. Ralph L. Kitchell (ISU '43), assistant dean, College of Veterinary Medicine, University of Minnesota, and professor and head, Division of Veterinary Anatomy, reported at the International Symposium in London, July 26-28, 1961, on the assessment of pain in man and animals.

The report was entitled "Methodological Considerations of Assessment of Pain Perception in Animals." Co-authors are: Y. Naitoh, B.A., M.A.; J. E. Breazile (MO '58), B.S., D.V.M.; and J. M. Lagerwerff, M.D., A.M.I.E.T.; all from the College of Veterinary Medicine, University of Minnesota.

Fifty scientists from Great Britain, Sweden, West Germany, France, Switzerland, and the United States were invited to attend the symposium. Other participants from the United States were: Dr. H. K. Beecher, Harvard Medical School; Dr. D. Bonnycastle and Dr. J. D. Hardy, Yale School of Medicine; and Dr. R. W. Houde, Sloan-Kettering Institute, New York City, N.Y.

The symposium was sponsored by the Universities Federation for Animal Welfare.

Young Scientists Trained at Purdue

The School of Veterinary Science and Medicine, Purdue University, is cooperating with the National Science Foundation during the summer of 1961 in the training of advanced high school students who are interested in careers in biological sciences and medicine.

Five students are spending four hours per day working on research projects in some field of veterinary medicine. They are also attending classes and seminars conducted by Purdue faculty members from the schools of agriculture and science, education, and humanities.

Learning methods of staining slides for bacteriologic study is part of the training of young scientists in the School of Veterinary Science and Medicine. Shown left to right are Dr. L. W. Tiffany, microbiologist on the veterinary staff; Michael J. Becker, Brazil, Ind.; and Rustin D. McIntosh, Terre Haute, Ind.

Michael J. Becker, Brazil, Ind., Phyllis J. Gross, Phoenix, Ariz., and Rustin D. McIntosh, Terre Haute, Ind., are working in research laboratories on projects concerned with the understanding and control of leptospirosis in domestic animals.

Ned A. Kauffman, Goshen, Ind., and Robert Strawbridge, Howe, Ind., are investigating tissue-culture techniques used in the propagation of viruses.

The students have been selected from a large number of applicants who were not only superior in academic work, but also were winners of science fairs and similar endeavors.

Dr. S. H. Madin to Direct Naval Biological Laboratory

Dr. Stewart H. Madin (TEX '43) has been appointed director of the Naval Biological Laboratory, University of California, Berkeley. He was also recently appointed professor of public health and bacteriology on the Berkeley faculty.

Previously he served as lecturer in bacteriology and during the past year as acting director of the Naval Biological Laboratory.

Dr. Madin was a veterinary research scientist with the University of California from 1943 to 1949, except for two years' active duty with the Navy, and has been a research pathologist with the Naval Biological Laboratory since 1951. From 1957 to 1960 he was assistant scientific director of the Laboratory.

His own research has centered on the pathology of infectious disease, on vesicular viruses of domestic animals, and on aspects of experimental pathology and tissue culture. He has been co-discoverer of several important viral diseases of domestic animals, and has done specialized work on the vesicular disease of swine. He also pioneered in the development and use of mammalian cell lines in studies of human and animal viruses.

Dr. Madin has served as consultant to the U.S. Army Chemical Corps, the USDA, and the U.S. Livestock Sanitary Association. He has also served for many years as a consultant to the Division of Animal Industry of the California State Department of Agriculture, assisting in the control of virus diseases of livestock.

For several years he taught the graduate-level course in experimental pathology in the Department of Bacteriology on the Berkeley campus. He has served as a member of the Chancellor's Planning Committee for Environmental Health and Safety at Berkeley and has held supervisory responsibility for the care and use of all laboratory animals on the campus.

Facilities of the Naval Biological Laboratory are located at the Oakland Naval Supply Center and on the Berkeley campus. It has a staff of 125 scientists and assistants, including both civilian and navy personnel. The Laboratory is engaged in studies on a wide variety of biological problems. Among NBL's current objectives are:

1. Study of selected epidemiologic characteristics and the aerobiologic behavior of disease agents.

2. Development and improvement of diagnostic and preventive procedures against air-borne contagion.

3. Development of detailed information on the bacteriology of certain little-known diseases encountered by naval personnel in foreign duty stations.

4. Support of these objectives by conducting basic studies in microbiology and related subjects including physiology, biochemistry, biophysics, and genetics.

Instrument Symposium and Equipment Exhibit Planned

The 11th Annual Instrument Symposium and Research Equipment Exhibit will be held October 9-12 and October 10-13, respectively, at the National Institutes of Health in Bethesda, Md.

Under the auspices of the local sections of six national professional societies, more than 20 scientists actively engaged in research in their specialties will report on recent developments in research methods and instrumentation.

At the research equipment exhibit, 121 of the nation's leading manufacturers of electronic, mechanical, and optical instruments for laboratory and clinical research will display a wide array of the latest scientific apparatus.

Six of the exhibiting firms will hold special instrumentation clinics to demonstrate the research applicability of their

newest equipment. Instruments shown will include an electronic spectrophotometer, refrigerated cell fractionator, atomic absorption analyzer, immunoelectrophoresis accessories, electronic hematocrit, and a protein monitor.

This year's symposium will consist of seven sessions. Dr. Alton Meister, chairman of the Department of Biochemistry, Tufts University School of Medicine, will preside over the opening session dealing with applied gas chromatography.

Other topics on the four-day scientific program are: factors influencing the interpretation of infrared spectrums, optical rotatory dispersion, thermogravimetric analysis, electron probe analysis, the application of physiologic instrumentation to clinical problems, and electron magnetic resonance.

Dr. N. K. Clapp Gets Fellowship for Radiation Biology Study

Dr. Neal K. Clapp, (OSU '60), instructor in clinics and surgery at Colorado State University's College of Veterinary Medicine, has received a training fellowship for research in radiation biology.

Dr. Neal K. Clapp

Sponsored by the National Cancer Institute through the National Institutes of Health, the $6,740 fellowship, effective about September 1, will involve study in some phase of the effects of ionizing irradiation on animals. Dr. Clapp's training will be under the direction of Dr. William D. Carlson (COL '52), head of the veterinary college's radiology section.

Gastric Ulcers To Be Studied at Kansas State University

"Etiology and Pathology of Procine Gastric Ulcers," is the subject of a new research project being undertaken by the Department of Pathology at Kansas State University.

A three-year grant totaling $17,250, has been received from the National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, for the research. The principal investigators are Dr. Embert H. Coles (KSU '45), associate professor of pathology, and Dr. Harry D. Anthony (KSU '52), assistant professor of pathology.

Dr. William Griffing (KSU '44), National Defense Education act graduate fellow in veterinary medicine, will do most of the research for use in his Ph.D. dissertation.

For the study of incidence of gastric ulcers in pigs, pig stomachs will be collected from various packing plants. Approximately 1,000 stomachs will be examined and, in cases where ulcers are present, a careful check will be made of the pig's diet and handling before slaughter in an attempt to determine the cause of the ulcer.

The research workers also will study the bacteria and fungi that might be involved and the over-all gross and microscopic pathology of the stomach.

National Group Discusses Grub Control

Grubby cattle are damaged cattle.

Successful control through use of systemic insecticides as a spray, in a dipping vat, or as a feed additive is now available.

Time of treatment for cattle going into the feedlot hinges on where cattle were grazed during heel fly season and the length of the feeding period. For stock cattle, timing is dependent upon the end of the egg-laying season of the heel fly where animals are pastured.

These were the "why," "how," and "when" considerations of successful cattle grub control outlined in a recent workshop session of the National Cattle Grub committee sponsored by Livestock Conservation, Inc. Ten men were selected for the workshop session to represent the various segments of the livestock industry involved in cattle grub control. They represented packing plants, university extension services, and national livestock and farm organizations.

Effective cattle grub control in the feedlot has many economic advantages, it was pointed out. Among those reported by successful cattle feeders are: more packer-buyer competition for grub-free cattle; reduc-

tion of stress in the feedlot during the grubby period; effective lice control for full season; improved health and indications of higher daily gains; no waiting for grubs to clear up before cattle can be marketed; minimized fly problems, elimination of fence rubbing, and no further need for back scratchers or rubbers.

The workshop session stressed the need for correct timing and proper application in the use of the systemic materials. It also emphasized the importance of reading and following the manufacturer's directions.

Oklahoma State University Adds to Faculty

Oklahoma State University has announced the addition of four faculty members to its College of Veterinary Medicine.

Dr. E. R. Baird (OKL '59) joined the faculty on March 1, 1961, as an assistant professor in veterinary physiology and pharmacology. Dr. Baird has been in small animal practice in Oklahoma City since graduation.

Dr. Charles R. Butler (TEX '61) joined the faculty July 1, 1961, as an instructor in the Department of Veterinary Medicine and Surgery. He plans to do graduate work at Oklahoma.

Dr. James G. Graham (OKL '61) joined the staff on June 1, 1961, as an instructor in veterinary anatomy. He plans to do graduate work.

Dr. C. B. Wanzant (OKL '61), who joined the staff on June 1, 1961, as an instructor in veterinary anatomy, will also do graduate work.

College of Veterinary Medicine, Quebec, Names New Secretary-Treasurer

Dr. Marcel Bourassa (MON '52) has recently been named secretary-treasurer of the College of Veterinary Medicine of the Province of Quebec. He replaces Dr. Jacques Nantel (MON '49), who resigned to devote all of his time to his postdoctoral studies.

Dr. Bourassa went to Paris to study the technology of meats immediately after graduation from veterinary college. He then returned to Canada and entered federal service in the Division of Meat Inspection, Department of Agriculture.

He has been secretary of the Veterinary Section of the Professional Institute of Canada for two years. He is a member of the Canadian and Montreal V.M.A.'s.

AVMA Presses Search for Director of Scientific Activities

The AVMA Board of Governors and Executive Board have recently intensified their search for the right veterinarian to fill the staff position of Director of Scientific Activities vacated by Dr. L. Meyer Jones last May.

The AVMA Director of Scientific Activities is responsible for developing and maintaining liaison between the AVMA and drug regulatory agencies of the federal government, with pharmaceutical and biological product manufacturers, and with other professional organizations. He is responsible for promoting scientific exhibits at the annual meetings of the AVMA, and also for serving as consultant to the AVMA Council on Research and to the AVMA Council on Biological and Therapeutic Agents.

AVMA is searching for a veterinarian with special training and experience in physiology and pharmacology to fill this position. However, veterinarians with backgrounds in microbiology and other disciplines will also be considered if they have other necessary qualifications.

Applicants should contact Dr. H. E. Kingman, Jr., AVMA executive secretary.

International College of Applied Nutrition Activated

The International College of Applied Nutrition (ICAN), a professional society devoted to the science and art of nutrition in

research and in clinical practice, was fully activated at the first annual meeting, April 7, 1961. ICAN was incorporated as a California non-profit corporation March 30, 1960.

Basic requirements for fellowship and associate fellowship are the professional use of the science and art of nutrition in research or in clinical practice and the holding of a doctorate or comparable degree. Applications for consideration as charter members will be accepted up to Dec. 10, 1961.

Also incorporated was the International Board of Applied Nutrition. Its purpose is to establish qualifications for the practice of nutrition, hold examinations, and certify those nutritionists whom the Board finds qualified.

One veterinarian, Dr. A. H. Edmondson (TEX '44), Pasadena, Calif., is a member of the founding group.

Ohio State University Presents Alumnus Awards

Dr. Willard F. Guard

Dr. Joseph H. Drayer

Dr. H. C. H. Kernkamp

The 1961 Distinguished Alumnus Awards of the College of Veterinary Medicine, Ohio State University, were presented in a special ceremony June 8, 1961. They were given to:

Dr. Willard F. Guard (OSU '12), professor emeritus, Department of Veterinary Surgery and Radiology, Ohio State University, "for his broad interest and contribution to the profession, for his fine leadership in the field of clinical medicine for many years, and for his sincere interest in teaching and the maintenance of high standards of education."

Dr. H. C. H. Kernkamp (OSU '14), professor emeritus, College of Veterinary Medicine, University of Minnesota, "in recognition of an exemplary life of service to the profession, his inspiration and constant search for new truths, and the extension of the frontiers of knowledge."

Dr. Joseph H. Drayer (OSU '13), retired deputy health commissioner, Columbus, Ohio, "for his vision and pioneering leadership in the field of public health and the recognition it has brought to the veterinary profession, for the excellent contribution to the teaching program of the Ohio State University, College of Veterinary Medicine, and the stimulation afforded the many students who have come under his supervision."

Colorado V.M.A. to Participate in Medical Activities

The Colorado V.M.A. is now laying plans to participate in two medical society-sponsored events this fall.

A half-day session at the annual convention of the Colorado State Medical Society next October will be devoted to veterinary medicine. Veterinarians tentatively scheduled to speak at the session are Dr. David K. Detweiler (UP '42), cardiovascular specialist from the University of Pennsylvania; Brig.-Gen. J. A. McCallam (UP '17), AVMA legislative representative, Washngton, D.C.; and Col. Fred Mauer (WSU '37), Armed Forces Institute of Pathology, whose specialty is virology.

For the first time, the veterinary profession has been invited to participate in the medical-sponsored Colorado Health Fair. The Colorado V.M.A. appropriated $2,500 to be used in building the exhibit to be shown at the fair. They hope to build an exhibit showing an actual animal hospital and live animals.

WHO, International Office of Epizootics Form Liaison

The World Health Organization and the International Office of Epizootics have announced the formation of a formal liaison.

The agencies have agreed "to act in collaboration and to keep each other informed on matters of common interest, particularly those concerning zoonoses."

The agreement calls for reciprocal representation at agency meetings. Representatives will participate in deliberations on

matters of mutual interest, but shall not have a vote.

Information on documents, projects, activities, and programs will be exchanged by the

Dr. R. K. Benn Retires

Dr. Robert K. Benn

Dr. Robert K. Benn (KCV '14), veterinarian in charge, St. Joseph Stockyards, St. Joseph, Mo., retired from federal service April 30, 1961, after 25 years' service with the USDA.

Dr. Benn entered regulatory work in Iowa in 1935 with the former U.S. Bureau of Animal Industry. He served the Bureau in South Dakota, Arkansas, Missouri, and Oklahoma in the various field activities that are now conducted by the Animal Disease Eradication Division. In 1955 he was transferred to the St. Joseph Stockyards and became veterinarian in charge.

Dr. Benn is a member of the AVMA, the Missouri V.M.A., and the National Association of Federal Veterinarians.

Veterinarian Honored for Kindness

Dr. A. A. Hermann (COL '10) was awarded a citation on Aug. 9, 1961, by the United States Army and Fitzsimons General Hospital, Denver, Colo., for "more than eight years of generosity, kindness and patriotic service." Dr. Hermann, 74, is retired.

The citation read: "During the period of June, 1953, to June, 1961, Dr. Hermann grew flowers from which he supplied large quantities, without cost, to Fitzsimons General Hospital, for the patients.

"During this time he expended a great deal of energy, time, and personal funds in an effort to produce more and better flowers. The flowers which he has grown and given to this hospital are comparable to those grown by the best professional florists. He has supplied enough flowers for each bed patient to have a small bouquet with larger bouquets for each of the wards.

"Having assisted the Army in maintaining the welfare and morale of its patients through his dedicated, philanthropic and humane service, Dr. Hermann is worthy of the highest order of recognition by Fitzsimons General Hospital, the Office of the Surgeon General, and the United States Army."

Dr. Hermann had practiced in the Denver area from 1918 until he retired 15 years ago after a heart attack. Both of his daughters, one a veterinarian herself, married veterinarians. Dr. Hermann's grandson is an Army veterinarian at Aberdeen Proving Ground, Md.

The citation was presented by Major General Carl W. Tempel, commanding general of the hospital.

Annual Conference Held at Auburn

The 54th Annual Conference of Auburn University's School of Veterinary Medicine was held July 23-26. More than 200 veterinarians, 70 students, and 30 faculty members attended the meeting.

Dr. William A. Rader (MSU '41), Lakeview, Mich., was a guest speaker. Dr. Rader discussed contract veterinary medicine. He said that the main aim of a contract is to give a farmer a more complete service in veterinary medicine at a pre-arranged fee. He emphasized that it is of utmost importance to have included in the contract the exact, specific services both the client and the veterinarian want. Once they have agreed on what is desirable in their contract, this should be examined and the contract drawn up by a competent lawyer for the best interest and protection of both parties.

Another guest speaker, Fred R. Robertson, acting director of the Cooperative Extension Service at Auburn, advocated a vigorous program of "Rural Resource Development" in Alabama. "Everyone in agriculture will surely agree that a large share of Alabama's economic future depends upon how well we are able to further develop our livestock industry," he said. "We know that veterinarians are important members of the team that can encourage livestock producers to make full and efficient use of the resources which

they have at their disposal. Such action is essential to an effective rural resource development program and we want you to be a part of it."

Hog cholera eradication programs, on both the federal and state level, were urged by Dr. Karl R. Owens (AUB '35), Gainesville, Fla. Dr. Owens said " 'The veterinary profession has to constantly strive to eliminate the need for its existence in order to justify its existence.' I do not know when or by whom this statement was made. However, if we use this thinking as a premise, we are forced to the conclusion that our profession has failed miserably in this role, with reference to hog cholera." Dr. Owens described the pilot hog cholera eradication program that has been carried out in Florida since 1956 (*see J.A.V.M.A.* Vol. 137, Nov. 15, 1960: 629).

Other speakers and their subjects were: Dr. Gibbs Ashley (AUB '45), Winter Garden, Fla., nature, treatment, and observations of anaplasmosis; Dr. J. J. Fishler (MSU '46), Elkhart, Ind., feline conditions and radiology; Dr. R. S. Guthrie (COR '30), Ithaca, N.Y., milking machine defects demonstration (closed-circuit television); and Dr. H. R. Seibold (UP '31), Plum Island, N.Y., clinical recognition of exotic diseases.

In the opening address of the conference, Dr. J. E. Greene (AUB '33), dean of the School of Veterinary Medicine at Auburn discussed the progress made at the school within the past year. He also pointed out the need to encourage qualified students to choose veterinary medicine as a career and said that in an effort to do this Auburn faculty members have participated in high school programs, conducted a program for 700 4-H members who visited the campus, and presented a program for teachers of vocational agriculture.

Dr. Deam Ferris shows graduate students the test tubes which were used to prove mice in the isolators were free of bacteria. Left to right: graduate students taking epidemiology course, James Reilly (hands in gloves) and Dr. James Fitzgerald; instructors, Dr. Ferris, Dean Carl Brandly and Professor Norman Levine.

Germfree Mice Used in Epidemiology Course

For the first time in the teaching of an epidemiology course, students at the University of Illinois were trained in using germfree laboratory animals as a research tool.

Working under the direction of Drs. C. A. Brandly (KSU '23), D. H. Ferris (ILL '53), and N. D. Levine (ISU '33), students established a colony of germfree mice and then conducted an experimental epizootic in both germfree and normal mice.

The germfree colony is also being used for developing maximally pathogen-free laboratory animals which will be free of viruses as well as bacteria. The germfree colony was established by the College of Veterinary Medicine with the cooperation of Dr. P. C. Trexler of the Biology Department of Notre Dame.

Before germfree mice were introduced into the epidemiology course, normal mice were infected with *Salmonella typhimurium* and *Pasteurella multocida* and used as models of epidemics in men and epizootics in animals.

The epidemiology course is part of the activities of the newly organized Center for Zoonoses Research at the University of Illinois.

Tuskegee Announces Faculty Changes

The School of Veterinary Medicine at Tuskegee Institute has announced the retirement of Dr. G. W. Cooper (COL '18). Dr. Cooper was director of clinics and head of the school's Department of Large Animal Medicine, Surgery, and Clinic.

Additions to the school's staff are: Drs. B. L. Woods (TUS '61), instructor, Department of Large Animal Medicine, Surgery, and Clinic; and Aron Wright (TUS '61), in-

structor, Department of Small Animal Medicine, Surgery, and Clinic.

Dr. E. H. Jones, instructor, Department of Small Animal Medicine, Surgery, and Clinic, has announced his resignation from the school's faculty.

Five Veterinarians Appointed as Collaborators at Iowa State

Five veterinarians who are on the staff of the new National Animal Disease Laboratory, Ames, Iowa, have accepted appointment at Iowa State University as collaborators.

They are: Dr. Robert W. Dougherty (OSU '36), professor, department of Veterinary Physiology and Pharmacology; Dr. Alfred G. Edward (COL '52), professor, Department of Veterinary Medicine and Surgery; and Dr. Archie H. Frank (MSU '34), Dr. Chester A. Manthei (MSU '35), and Dr. Lawrence O. Mott (KSU '29), professors, Department of Veterinary Hygiene.

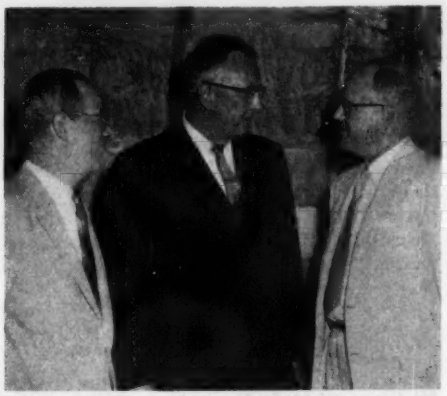
The only previous Iowa State appointment of collaborator from the National Animal Disease Laboratory staff was that of Dr. William A. Hagan (KSU '15), director of the laboratory.

Humane Livestock Slaughter Program Progresses

Most of the food animals being handled today in federally inspected meat packing plants are slaughtered humanely, an indication of progress that has been made since the Humane Slaughter Law became effective a year ago, reports the USDA.

Reporting through Assistant Secretary of Agriculture Frank J. Welch to the Humane Slaughter Advisory Committee in Washington, USDA Secretary Orville L. Freeman said that latest figures compiled for a single month's operation show that 8.5 million animals receiving federal meat inspection were slaughtered in plants using humane methods.

Federally inspected slaughtering plants using humane methods now number 484. About 18 months ago a member of the advisory committee estimated that only 124 plants were equipped to slaughter livestock humanely.



AVMA Director of Professional Relations, Dr. James R. Hay (center) talks with Dr. B. T. Shaw, administrator, Agricultural Research Service, USDA, (left) and Assistant Secretary of Agriculture, Frank J. Welch after the Humane Slaughter Advisory Committee meeting.

The committee advises USDA on humane livestock slaughter methods, research, and public information programs.

The humane slaughter law became fully effective for the meat-packing industry Aug. 31, 1960. It provided that meat and meat products sold to federal agencies must come from animals slaughtered by methods spelled out in humane slaughter regulations.

Dr. James R. Hay (OSU '39), director of professional relations, represents AVMA on the advisory committee. Dr. C. Donald Van Houweling (ISU '42), assistant administrator, Agricultural Research Service, USDA, is chairman.

Kansas State University Announces Faculty Changes

Kansas State University's School of Veterinary Medicine has announced three faculty changes.

Dr. Orlen E. Pfeifer (KSU '51), instructor in the Department of Surgery and Medicine, resigned from the faculty to enter private practice. His resignation was effective June 30.

Dr. David Loren Carnahan (KSU '59) was employed, effective August 1, to fill the position of instructor, Department of Surgery and Medicine, vacated by Dr. Pfeifer. Dr. Carnahan has been associated with the Agricultural Research Service in animal disease eradication at Garden City, Kan.

Dr. Nedon Russel Christensen (WSU '59)

was employed as instructor in the Department of Surgery and Medicine, filling a newly created position. He has been assigned to the small animal clinic section. Dr. Christensen had been in small animal practice in Arcadia, Calif. His appointment became effective July 1.

Michigan V.M.A. Elects New Officers

New officers elected at the 79th annual meeting of the Michigan V.M.A. June 29 to July 1, 1961 are: Drs. John Donovan (ONT '41), Detroit, president; T. I. Millerick (MSU '44), Saginaw, president-elect; Charles Hodder (MSU '36), Detroit, first vice-president; George Freier (MSU '43), Benton Harbor, second vice-president; Robert Johnson (MSU '40), Yale, third vice-president; Paul Howard (MSU '22), Grand Rapids, treasurer; and Robert Willson (MSU '36), Detroit, secretary.

Ohio V.M.A. Presents 50-Year Awards

The Ohio V.M.A. recently presented pins to three members who had completed 50 years of membership in the association.

They were: Drs. F. A. Zimmer (OSU '09), Columbus, Ohio; B. H. Edgington (OSU '12), Columbus, Ohio; and C. D. Turney (OSU '09), Miami, Fla.

They are the first recipients of the 50-year award.

Kentucky V.M.A. Approves Hog Cholera Eradication, Requests Change in Practice Act

At its golden anniversary meeting, July 17-18, 1961, the Kentucky V.M.A. voted unanimous approval of the federal Hog Cholera Eradication Program and announced its intention to request legislation that would make a professional code of ethics an integral part of the State Practice Act. Kentucky V.M.A. members feel that the Act should be so amended because it presently

Officers of the Kentucky V.M.A. are (seated left to right): Drs. S. A. Glass, retiring president; and J. C. Luckett, president. Standing (left to right) are: Drs. R. L. Hectorne, first vice-president; T. N. Snyder, second vice-president; H. E. Binks, third vice-president; and L. S. Shirrell, secretary-treasurer.

provides that no punitive action can be taken unless the accused person is found guilty of committing a misdemeanor.

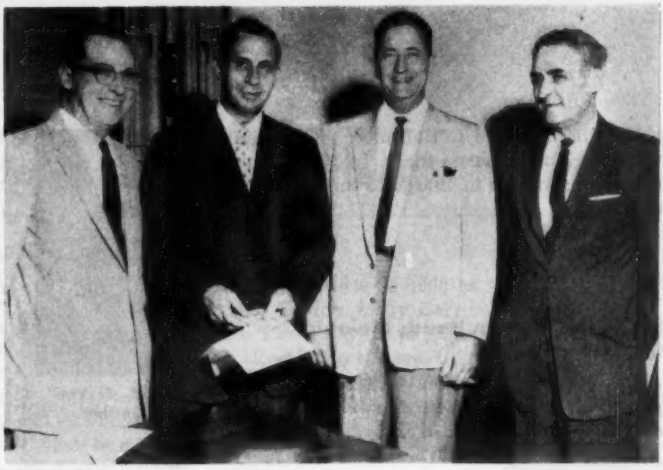
Association officers elected at the meeting are: Drs. J. C. Luckett (OSU '50), Russellville, president; R. L. Hectorne (OSU '28), Louisville, first vice-president; T. N. Snyder (AUB '55), Louisville, second vice-president; H. E. Binks (ONT '49), Lawrenceburg, third vice-president; and L. S. Shirrell (ISU '52), Frankfort, secretary-treasurer.

Dr. O. J. Hummon Receives Award for Improved Brucellosis Testing

Dr. Ormond J. Hummon (OSU '30) received the largest single cash award for special employee achievement ever made in the USDA's Agricultural Research Service in August 1.

Dr. Hummon, chief staff officer for laboratory services in the ARS Animal Disease Eradication Division, was presented a citation and an award of $1,510 for developing an improved procedure for collecting samples for the brucellosis ring test and improving the efficiency and acceptability of the test. It is estimated that savings resulting from his work will amount to $1 million annually.

The modification suggested and developed



Dr. Ormond J. Hummon (second from left), who was given an award of $1,310 for improving a testing procedure in brucellosis detection, is shown with (left to right) Drs. Byron T. Shaw, administrator of the USDA Agricultural Research Service; R. J. Anderson, director of the ARS Animal Disease Eradication Division; and C. K. Mingle, veterinarian in charge of brucellosis eradication for the division.

by Dr. Hummon permits laboratory workers to use samples routinely collected by dairy plants for determining the butterfat content of milk. The old procedure required collections for the brucellosis ring test from each milk producer's shipments to the dairy plants. Using Dr. Hummon's modification, one technician can now collect more samples in a day than three using the former procedure.

Other advantages of the new method are improved accuracy of brucellosis testing, improved relations with dairy plant operators, speedier testing, and fewer return trips to dairy plants for milk samples from individual producers.

Dr. Hummon conceived the idea of using the Babcock butterfat sample in brucellosis ring testing in 1952. Wisconsin livestock sanitary officials initiated extensive field trials which were completed in 1957. The modified method was adopted for state-wide use in Wisconsin in July of that year. Wisconsin officials estimate that the new method has resulted in annual savings of $100,000 in state funds and another $100,000 in federal brucellosis funds in that state alone.

Florida Veterinarians Hear Russian Scientists

South Florida veterinarians were recently the guests of the South Florida Chapter of the American College of Surgeons when they entertained five Russian scientists in Miami.

The Russians included Professor N. G. Anan'yev, chief surgeon of the Moscow Institute and editor of *New Soviet Surgical Apparatus and Instruments and their Application,* recently published by Pergamon Press.

The program consisted of films (in Russian) and discussion (in Russian) of Soviet appliances for mechanically stapling and suturing various body tissues.

Veterinarians in attendance were: Drs. R. E. Evans (OSU '52), West Palm Beach; J. J. McCarthy (COR '39), West Palm Beach; C. E. Bild (ISU '33), Miami; J. L. Johns (AUB '42), South Miami; R. P. Knowles (AUB '44), Miami; and J. H. Yarborough (ISU '23), Miami.

Dr. C. A. Turner Retires

Dr. Charles A. Turner (MCK '18), veterinarian in charge, Baltimore, Md., USDA Animal Disease Eradication Division, Agricultural Research Service, retired July 7, 1961.

Dr. C. A. Turner

Dr. Turner had been in federal service for 35 years. Baltimore, Md. had been his official station since 1926, the major portion of his government career.

After graduating from veterinary college, Dr. Turner became assistant state veterinarian in Illinois in 1919 and remained in that capacity until 1926 when he entered federal service with the former Bureau of Animal Industry, doing field work on tuberculosis and brucellosis eradication. In 1949 he became assistant veterinarian in charge, Richmond, Va., and

in 1951 he returned to Baltimore as assistant veterinarian in charge there. In 1952 he became veterinarian in charge of the Baltimore station.

Dr. G. O. Johnson Heads Biologics Control at Ames

Dr. George O. Johnson (COL '48) has been promoted to the position of chief veterinarian, Biologics Control, USDA National Animal Disease Laboratory, Ames, Iowa.

Dr. George O. Johnson

He will head a group of approximately 50 veterinarians, bacteriologists, subprofessional and supporting aides engaged in a program of biological products testing, test standards improvement and test standards development.

More than 1,000 product licenses are presently being held by about 65 commerical manufacturers for the production and distribution of a large variety of veterinary vaccines, serums, bacterins, diagnostic agents, and analogous products. The need for potency and safety check testing of these commercially produced vaccines has existed for many years, with the need becoming more urgent with the development of modified live virus vaccines in recent years. Living virus vaccines account for about 90% of the total yearly production of over 4 billion doses of all veterinary biological products.

Dr. Johnson's service with the USDA consists of the following: Foot-and-Mouth Disease Commission, Mexico; Veterinary Biological Products Inspection, Berkeley, Calif., and Omaha, Neb.; and Veterinary Biological Products Licensing, Washington, D.C.

He transferred to Ames, Iowa from Washington, D.C., where he had served as assistant staff officer, Veterinary Biologics Licensing, since July, 1960.

Dr. L. F. Van Gorder Transferred

The transfer of Dr. L. T. Van Gorder (ONT '49) from the USDA Animal Disease Eradication Division staff, Washington, D.C., to Harrisburg, Pa., as assistant veterinarian in charge, was effective July 2, 1961.

Dr. L. F. Van Gorder

Following graduation from veterinary college, Dr. Van Gorder served with the USDA Bureau of Animal Industry in Maine, the West Virginia State Department of Agriculture, and the State of Delaware. In 1951 he re-entered federal service in Delaware. In 1953 he was transferred to Missouri and in 1958 was appointed staff assistant in the Tuberculosis Eradication Section, Washington, D.C., and later served in the same capacity with the Special Diseases Eradication Section.

Dr. Van Gorder is a member of the AVMA, the U.S. Livestock Sanitary Association, and the National Association of Federal Veterinarians.

Dr. A. H. Dardiri Gets Plum Island Post

Dr. Ahmed H. Dardiri (CAI '45), has been appointed to a position in diagnostic investigations at USDA's Plum Island Animal Disease Laboratory.

Dr. Ahmed H. Dardiri

Dr. Dardiri was an officer in the Veterinary and Animal Breeding Division of the Egyptian Ministry of Agriculture from 1951 to 1955. He also served with the International Cooperation Administration in Egypt. During this assignment, he spearheaded a mass distribution program of American poultry to Egyptian farmers.

From 1956 to 1959 he was assistant research professor at the University of Rhode Island. He has written several scientific publications on equine encephalomyelitis, evaluations of vaccines for Newcastle disease, and pathogenic and orphan viruses. In 1959 Dr. Dardiri received a National Science Foundation Award to the Tissue Culture Association Seminar at the Colorado School of Medicine.

Veterinary Military News

Colonel Zacherle Retires

Colonel G. H. Zacherle

Colonel George H. Zacherle, Jr. (UP '33), commanding officer, Fifth U.S. Army, Veterinary Food Inspection Service, Chicago, Ill., was awarded the Army Commendation Medal and Certificate of Achievement at the time of his retirement June 30, 1961.

Colonel Zacherle had been in the Army for 21 years. Before entering service, he maintained a general practice, taught at the University of Pennsylvania, and worked in dairy inspection.

First Army Chief Veterinarian Named

Colonel Charles W. Gollehon (ONT '33) has been appointed chief veterinarian for the First United States Army. He succeeds Colonel Neil O. Wilson (WSU '31) who retired on June 30.

Colonel Gollehon took his new post at First Army Headquarters from the Office of the Assistant for Veterinary Services, The Surgeon General's Office, Washington D.C., where he has served since 1959.

He had been with the Department of Agriculture up to the time of his call to active duty with the Army in 1941. He received a direct commission in the reserves in 1936 and was integrated into the regular Army in 1946. From 1946 to 1950 he was at the First Army Boston Army Base.

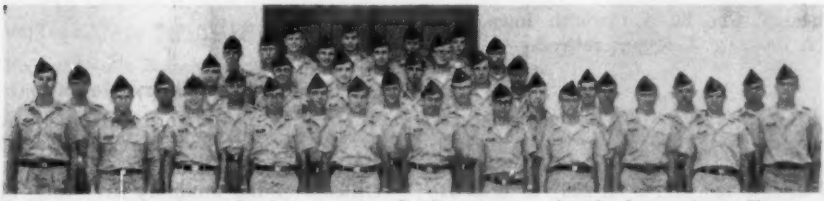
In 1950 he went to Europe as veterinarian of Headquarter Area Command in Heidelberg. From 1953 to 1956 he was area veterinarian at the Presidio of San Francisco, Calif. Before being called to The Surgeon General's Office he served at Headquarters, Military Subsistence Supply Agency in Chicago, Ill., for three years. He has been awarded the Army Commendation Medal, and is a member of the AVMA and the Association of Military Surgeons.

Lt. Col. R. B. Morgan Promoted

Lieutenant Colonel Richard B. Morgan (ISU '43) instructor in the Department of Veterinary Science at the Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, recently was promoted during a visit to the school by Brig. Gen. Russell McNellis, chief of the Veterinary Corps.

Colonel Morgan first entered the Army in 1943, immediately after he received his D.V.M degree. During World War II he served as a veterinarian with the 605th Field Artillery Battalion in Italy. From 1946 to 1949 he was in private practice in Springfield, Minn.

Since his return to active duty he has been inspector of meat and dairy products in Chicago, Ill., and Kansas City, Mo., and at the Alaska General Depot. In 1959 he received



The largest group of veterinarians to enter the Army at one time is shown above. They are attending a military orientation course at the Medical Field Service School. Thirty-eight are in an eight-week course to prepare them to be military veterinary officers. One, having completed an accelerated basic course, is attending a six-week course for preventive medicine officers before leaving Brooke Army Medical Center for his first duty assignment.

his M.S. degree in public health at the University of Michigan, and also completed the Advanced Military Preventive Medicine Course at Walter Reed Army Institute of Research in Washington, D.C. He assumed his present duties in December, 1959, and a year later became a member of the American Board of Public Health.

Deaths

Star indicates member of AVMA

★**Peter F. Bahnsen,** 90, Americus, Ga., died July 6, 1961.

Dr. Bahnsen was Georgia's first state veterinarian. He was instrumental in the passage of Georgia's State Practice Act in 1908 and on his 70th birthday he was recognized by a resolution in the state House of Representatives for his pioneer work in cattle tick eradication. Also during his tenure in office as state veterinarian, great strides were made in providing Georgians with quality market milk.

He was the founder and first president of the Georgia V.M.A. in 1908 and he was secretary of the association for many years. He was president of the U.S. Livestock Sanitary Association in 1913; and he became an honorary member of the AVMA in 1953.

James T. Brown (KCV '15), 67, Albany, Mo., died May 3, 1961.

Dr. Brown practiced in Belleville, Ill., and then in Hampton, Iowa. He also worked with the federal government as a meat inspector. He retired three years ago.

Ernest R. Gee, 80, of Corwith, Iowa, died July 2, 1961. Dr. Gee was retired.

Charles L. Morgan (ONT '07), Shelburne, Ont., died May 14, 1961.

Dr. Morgan, a general practitioner, practiced in Chicago, Ill., from 1907 to 1913. He then moved to Shelburne where he practiced until his death. He was a life member of the Ontario V.M.A. His son, William R. Morgan (ONT '40), is veterinarian.

Walter H. Rozine (ONT '11), 74, Morenci, Mich., died June 13, 1961.

Dr. Rozine was a general practitioner in Morenci for the past 50 years.

★**Henry G. Stephenson** (KCV '18), 72, Independence, Kan., died May 28, 1961.

Dr. Stephenson was a general practitioner.

Frank A. Torrey (CVC '18), 64, Arlington, Minn., died May 22, 1961.

Dr. Torrey, who was retired, had practiced for 42 years in the Arlington area.

Women's Auxiliary

Ohio Women's Auxiliary Devises Fund-Raising Project

In an effort to obtain funds for the Ohio V.M.A. Student Loan Fund, the Women's Auxiliary to the Ohio V.M.A. has designed and will sell special veterinary Christmas greeting cards.

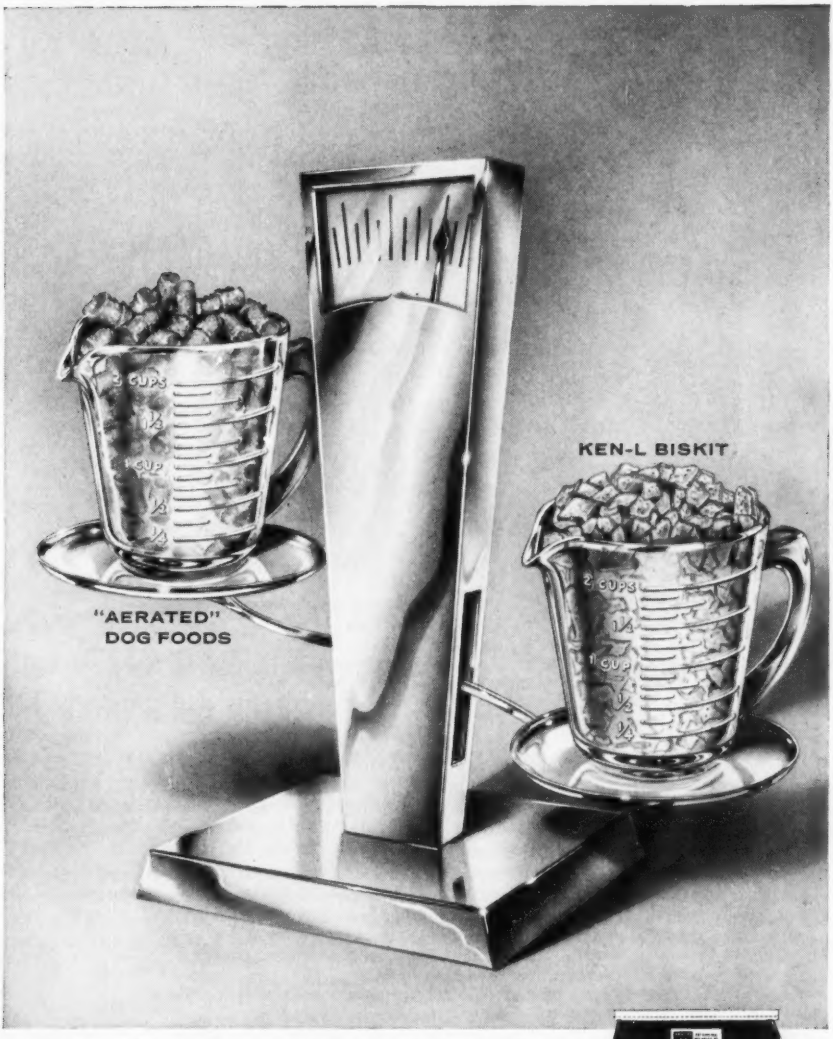
This is the second year they have used the Christmas card project to earn money for the fund. The money will be used for the financial assistance of students in the College of Veterinary Medicine at Ohio State University.

The Christmas cards are packed 25 to a box for $4.

South Carolina Auxiliary Meets

The annual meeting of the Women's Auxiliary to the South Carolina V.M.A. was held June 16, 1961 at Columbia.

Officers of the auxiliary are: Mrs. M. R. Blackstock, Spartanburg, president; Mrs. S. R. McMaster, Rock Hill, vice-president; Mrs. T. M. Rhodes, Charleston, secretary; and Mrs. L. C. Merritt, Sumter, treasurer.



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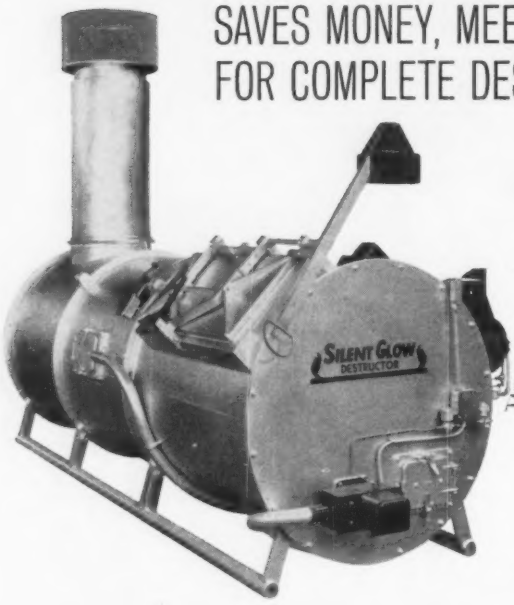

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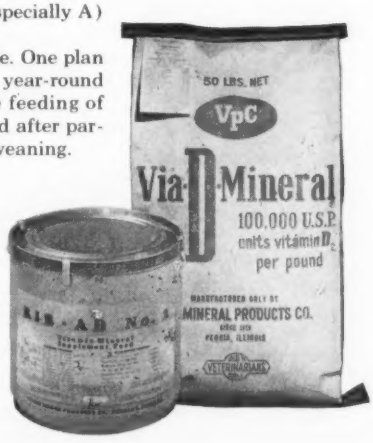

This supplemental feeding supplies the major elements of calcium and phosphorus; such trace elements as iodine, cobalt, iron, copper, zinc, manganese and others; plus vitamins A, D_2, D_3 and Riboflavin. Seems to promote more stamina in the dam for producing more potent colostrum for the calf. This feeding plan is worthy of your consideration.

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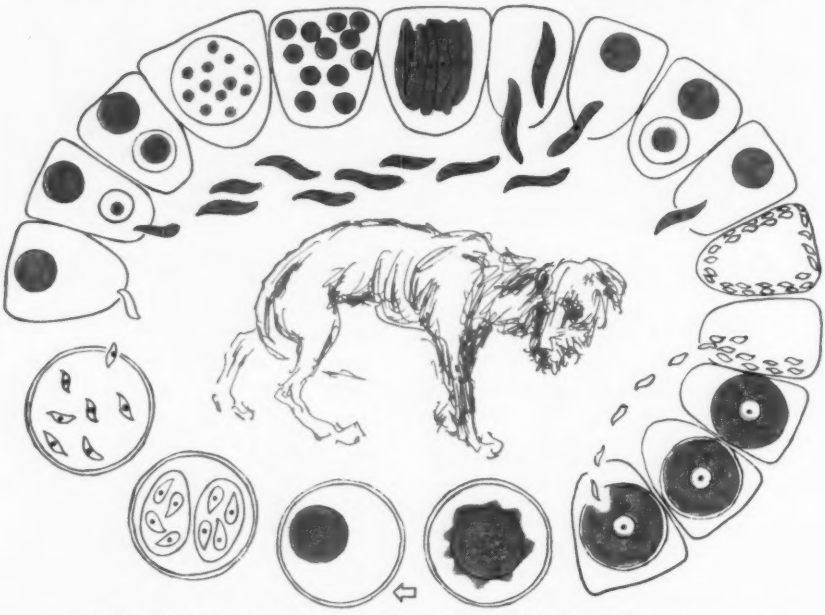
"a very common infection"
IN THE CANINE

Coccidiosis in the dog has been shown to be quite common.[1,2] Since coccidia may cause death in heavily infected young animals,[3] an understanding of this potentially serious disease should prove of interest to the veterinarian with a small animal practice.



ADAPTED FROM: MORGAN, B. B., AND HAWKINS, P. A.: VETERINARY PROTOZOOLOGY, BURGESS PUBLISHING COMPANY, MINNEAPOLIS, MINN., 1952.

The Classical Cycle of Isospora bigemina. The coccidia undergo repeated cycles of asexual multiplication (schizogony) finally terminating in formation of sexually differentiated *gametes*, which combine to form *zygotes*. At this stage a protective covering is formed. Sporulation (sporogony) may occur within the intestinal tract or after the oocyst is discharged in the feces of the host, depending upon the stage of the infection. When ingested by a new host, the *sporozoites* escape from the oocyst and enter the intestinal epithelium to repeat the cycle.

The Classical Signs of Coccidiosis. The predominant signs of coccidiosis in severe cases are bloody diarrhea, general weakness, anemia and rapid progressive emaciation. Oocysts will usually be found in the feces 5 to 6 days after the infection begins. The animal is depressed and weak and loss of appetite may be observed. It is important to note that at the outset of signs "coccidiosis may occasionally be confused with distemper."[2] Since the disease may be rapidly progressive, early therapeutic measures are necessary to improve the dog's chances for survival.

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INDICATIONS: in dogs for the oral treatment of: bacterial diarrheas, nonspecific diarrheas, and coccidial infection caused by Isospora sp. sensitive to FURACIN; and as an aid in controlling diarrheas associated with diseases such as distemper and hepatitis.

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REFERENCES: 1. Hagen, W. A., and Bruner, D. W.: The Infectious Diseases of Domestic Animals, Ithaca, Comstock Publishing Company, Inc., 1951. 2. Morgan, B. B., and Hawkins, P. A.: Veterinary Protozoology, Minneapolis, Burgess Publishing Company, 1952. 3. Enzie, F. D., and Price, E. W.: Internal Parasites of Dogs and Cats. *In* Animal Diseases: The Yearbook of Agriculture, 1956, United States Department of Agriculture, Washington, D. C. 4. Fisher, G. W.: Oral Use of Furadex in Canine Diarrhea, Mod. Vet. Pract. 39:133 (Mar. 15) 1958. 5. Smith, M. J.: Causes and Treatment of Canine Enteritis with Particular Reference to Coccidiosis, Southwest. Vet. 13:45 (No. 1) 1959. 6. Michaelson, S. M.: Physiopathology and Therapy of Diarrhea in the Dog, Northwest Vet. 3:22 (No. 3) Summer, 1960.

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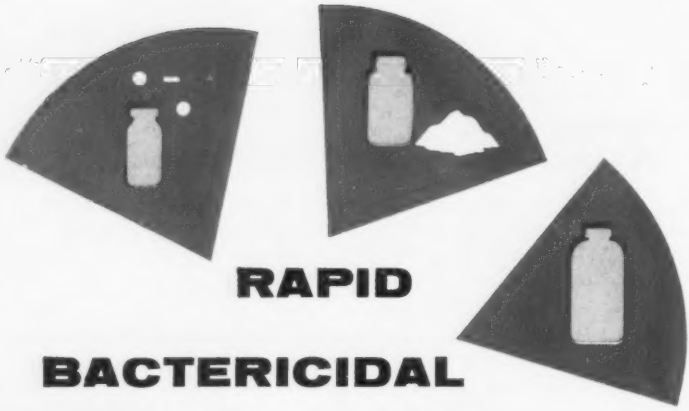

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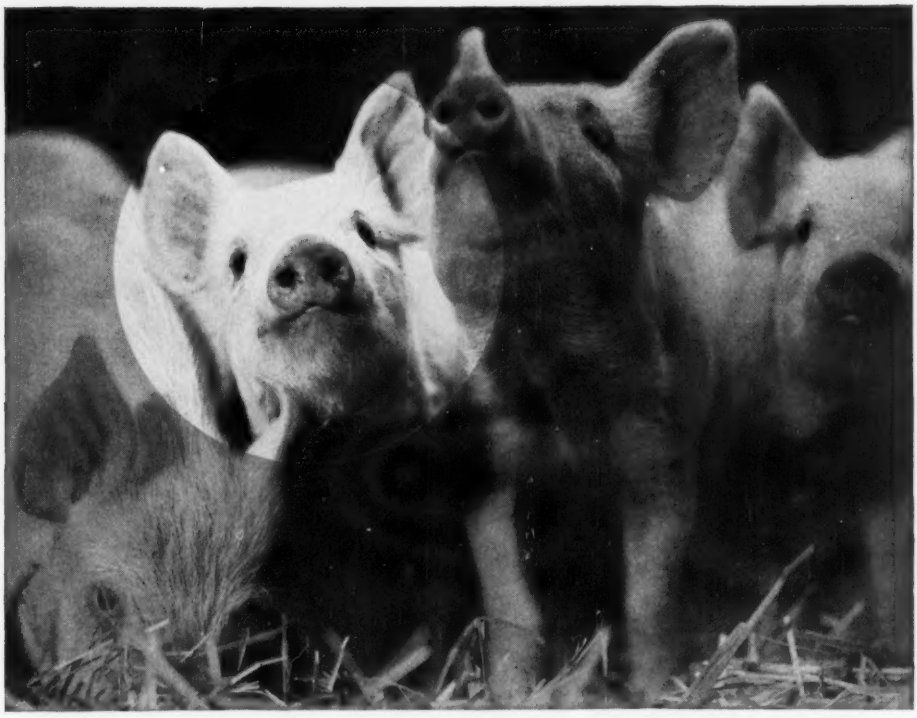

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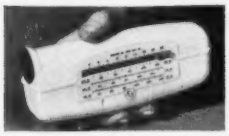

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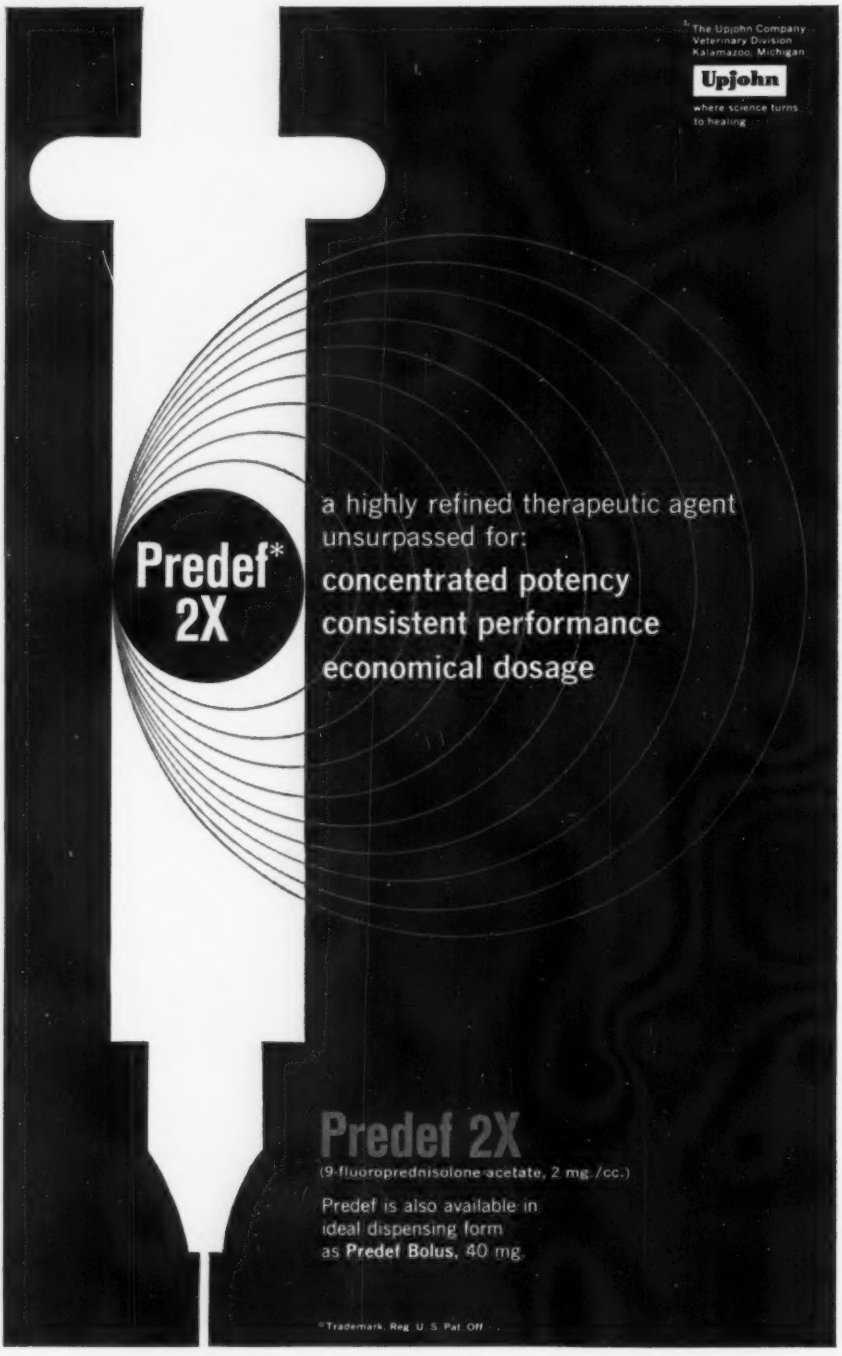
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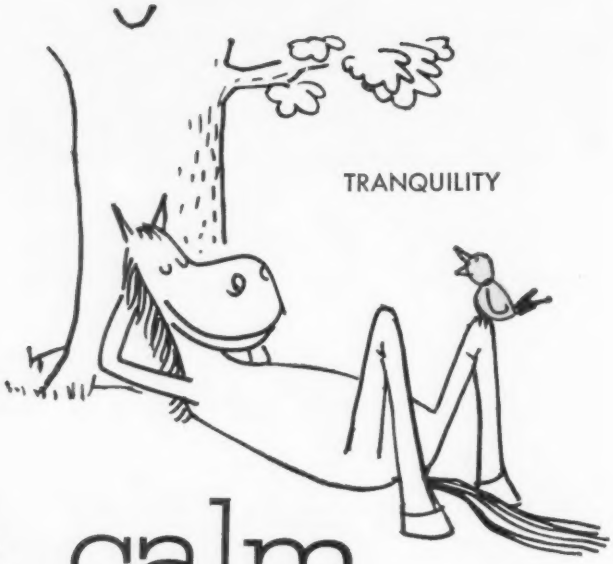

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Spontaneous Atherosclerosis of Swine

Bernard H. Skold, D.V.M., M.S., and Robert Getty, D.V.M., Ph.D.

FOCAL ATHEROSCLEROTIC lesions, characterized by the thickening of the intima with layers of foamy macrophages containing deposits of lipid material, were observed in the thoracic and abdominal portions of the aorta, in the coronary arteries, and in the anterior portions of the internal and external iliac arteries of swine. These arteries were obtained from swine which were used for gerontologic studies at Iowa State University. The condition represents an incidental finding in otherwise normal, healthy animals.

The pig is subject to an arterial lesion manifested by elevations and roughening of the intimal layer associated with deposition of lipids which has characteristics compatible with atherosclerosis of man.[1,3,5,7-10,13]

The thoracic and abdominal parts of the aorta and the anterior portion of the iliac arteries were examined from 45 swine of both sexes and of different ages and breeds. Lesions were found in all 45 (Table 1). They occurred most frequently in the abdominal portion of the aorta and in the anterior portion of the internal and external iliac arteries at the bifurcation of the terminal aorta. Lesions were found least frequently in the thoracic aorta. Atherosclerotic plaques also were observed in the coronary arteries.

From Iowa State University, Ames, where Dr. Skold is assistant professor and Dr. Getty is professor and head, Department of Veterinary Anatomy, College of Veterinary Medicine.

This work was supported, in part, by research grant H-4487 from the Department of Health, Education, and Welfare, U.S. Public Health Service, National Heart Institute.

Lesions

The gross lesions observed at necropsy were roughened, elevated, soft plaques on the intimal surface, measuring 2 to 15 mm. in diameter (Fig. 1 and 2). The more extensive lesions were roughened, elevated furrows occupying all portions of the abdominal aorta (Fig. 3). Small plaques were subtle in the unstained, gross specimen; however, the plaques and fatty streaks were easily demonstrated in the opened aorta after the gross specimen was stained with Sudan IV.[6] Varying degrees of severity were found (Fig. 1-4).

The microscopic lesions were observed as thickenings of the intimal layer by foamy macrophages. The criterion for atherosclerosis in this study was a significant focal collection of the lipid-laden macrophages in the intimal layer (Fig. 5-7). Changes in the ground substance adjacent to the lesions and in portions of the vessel apart from the site of atherosclerosis

were similar to those reported in man.[10] Disruption in the continuity of the internal elastic membrane was observed in the more severe cases (Fig. 6). Frozen sections were cut at 15 μ and stained with oil-red-O to demonstrate the deposits of lipid in the intimal layer of the vessels. Some typical abdominal aortic lesions of atherosclerosis in swine are shown in the illustrations (Fig. 5-10).

Materials and Methods

Forty-five swine, with documented birth and dietary records, ranging in age from 1 to 8½ years, were obtained from the Iowa State University swine herd and from other sources as special purchases. All were uncastrated males and females and represented nine breeds (Table 1). In all instances, they appeared to be normal, healthy swine with no outward manifestations of disease.

The swine were killed by electrocution. The aortas were removed and opened longitudinally, maintained in an open position by pressing onto square chip boards with the intimal surface uppermost, and fixed in neutral 4% formaldehyde solution. Gross staining with Sudan IV was accomplished the following day.[6]

The percentages of area involvement of the lesions were observed grossly in the stained aortas.[8,34] The observations in the thoracic and abdominal aorta and in the iliac arteries at the bifurcation of the aorta were recorded separately (Table 1). Confir-

TABLE 1—Incidence of Atherosclerotic Plaques Occurring in Different Areas of the Aortas of Swine

Pig		Age		Weight		Percentage of area with visible lesions after staining gross specimen with Sudan IV		
No.	Sex*	Yr.	Mo.	(lb.)	Breed**	Abdominal aorta	Thoracic aorta	Iliac artery proximal third aorta
10	S	1	0	No record	Poland China	5	0	2
41	B	1	6	350	Hampshire	5	0	2
43	B	1	6	280	Florida Swamp	5	0	0
40	S	1	8	150	Florida Swamp	5	10	0
24	B	1	9	580	Duroc	20	0	5
28	B	1	10	510	Duroc	10	0	5
34	B	1	10	516	Duroc	10	5	5
37	B	1	10	494	Hampshire	25	5	15
13	B	2	0	500	York-Ch. White	10	5	2
3	B	2	3	724	Duroc	30	10	5
33	B	2	3	577	Hampshire	30	0	5
42	B	2	4	651	Hampshire	20	5	10
18	S	2	5	520	Landrace	95	90	90
5	S	2	6	530	Chester White	10	5	3
29	S	2	8	355	Landrace	30	0	5
4	S	3	0	460	Chester White	10	0	5
14	S	3	6	517	Landrace	40	10	5
16	S	3	6	530	Landrace	50	0	25
21	S	3	6	480	Landrace	20	5	10
6	S	3	8	435	Chester White	20	0	5
22	S	3	10	375	Landrace	40	5	10
19	S	4	0	480	York-Ch. White	50	0	10
39	S	4	0	560	Landrace	5	0	0
45	S	4	0	390	Landrace	15	5	5
7	S	4	1	420	Chester White	40	5	20
11	S	4	6	720	Spotted Poland China	95	No specimen	20
20	S	4	6	700	Farmer's Hybrid	75	No specimen	40
31	S	4	6	720	Farmer's Hybrid	10	5	5
27	B	5	6	750	Farmer's Hybrid	20	5	10
30	S	5	6	785	Farmer's Hybrid	75	15	40
36	S	6	3	247	Hampshire	20	5	2
15	S	6	6	220	½York-¼Hamp-¼Tam.	20	0	10
17	S	6	6	315	½York-¼Hamp-¼Tam.	50	2	20
25	S	6	6	310	½York-¼Hamp-¼Tam.	20	5	5
35	S	6	6	500	½York-¼Hamp-¼Tam.	40	5	5
12	B	7	6	820	Farmer's Hybrid	75	50	10
23	S	7	9	383	Chester White	80	5	40
32	S	7	9	394	Chester White	60	2	40
38	S	7	9	443	Chester White	60	15	40
44	S	7	9	533	Chester White	60	5	15
1	S	8	0	400	Landrace	100	90	50
2	S	8	0	450	Yorkshire	100	25	50
9	S	8	6	253	Hampshire	20	5	2
26	S	8	6	330	Hampshire	20	2	5
8	S	8	6	300	Poland China	20	5	10

*S = sow, B = boar. **York. = Yorkshire, Ch. White = Chester White, Hamp. = Hampshire, Tam. = Tamworth.

—ISU Neg. A42182

Fig. 1—Mild involvement with atherosclerotic plaques in the vessels from a 4-year-old, Yorkshire-Chester White, crossbred sow (pig 19). The abdominal aorta and proximal iliac arteries are on the left. Arrows point to fatty streaks and plaques. The opened thoracic aorta on the right is free from visible plaques. Grossly stained with Sudan IV.

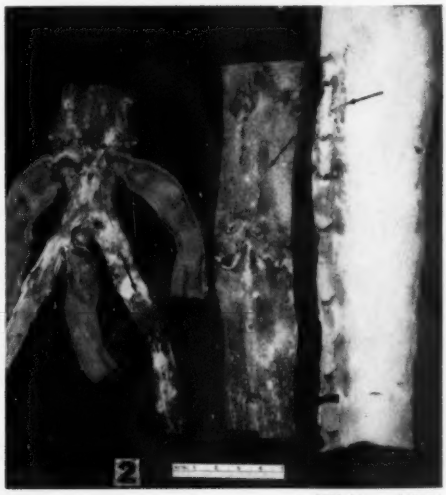

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Fig. 2—Moderate involvement of atherosclerotic plaques in the vessels from an 8-year-old, Yorkshire sow (pig 2). In the thoracic aorta on the right, about 25% of area is involved. Arrows point to plaques and streaks. The abdominal aorta in the center is covered with plaques which elevate the entire intimal surface. The proximal iliac arteries are shown on the left. Arrow points to an extensive plaque which almost occluded the internal iliac artery. Grossly stained with Sudan IV.

—ISU Neg. A42186

Fig. 3—Severe involvement with atherosclerotic plaques in the vessels from an 8-year-old, Landrace sow (pig 1). In the thoracic aorta on the right, there is 90% involvement of the surface by plaques and streaks. The abdominal aorta on the left with the proximal iliac arteries was the most severely involved of the 45 hogs studied. The entire surface is covered by furrowed plaques and streaks. (Indentations are areas sectioned for microscopic studies). Grossly stained with Sudan IV.

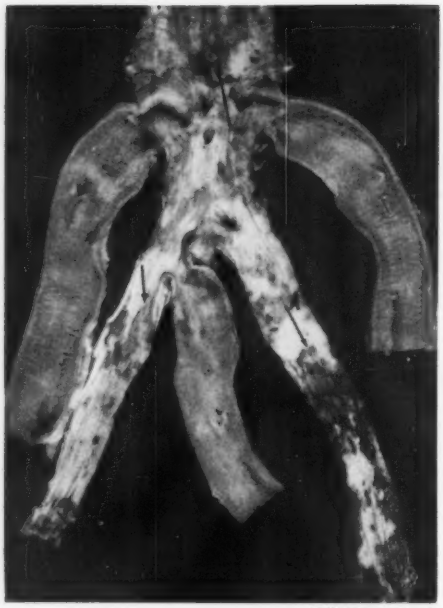

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Fig. 4—In a higher magnification of the internal iliac artery in Figure 2, there is visible the severe and extensive atherosclerotic plaque (A) which nearly occluded the vessel. Grossly stained with Sudan IV.

mation of lipid deposits was made by microscopic examination (Fig. 5-7).

Discussion

The occurrence of spontaneous arteriosclerosis in the aortas of swine slaughtered at meat-packing houses has been reported.[4] Some of the lesions described seemed compatible with the lesions of atherosclerosis which were found in the gerontologic studies at Iowa State University.

Review of the literature revealed no reports of atherosclerosis occurring spontaneously in healthy, uncastrated swine of both sexes. Intimal changes in the arteries of a 7-year-old female pig have been reported.[7] The changes described seem compatible with our criteria for atherosclerosis.

Atherosclerosis induced experimentally in swine, has been reported by several authors.[2,11,12] Their evidence suggests that diet influences the development of atherosclerosis. The rations of swine used in this study have not yet been analyzed.

The incidental finding of lesions in 45 hogs indicates that the arterial system of domestic swine is subject to a lesion that has many of the characteristics of athero-

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Legends for Figures 5-10 on Opposite Page

Fig. 5—Cross section of abdominal aorta of sow (pig 1), showing lipid deposits in the intima: (A) disrupted internal elastic membrane; (B) lipid deposit in the intima; (C) tunica adventitia. Frozen section; 15 μ; oil-red-O and Harris' acid hematoxylin stain; x 36; green filter.

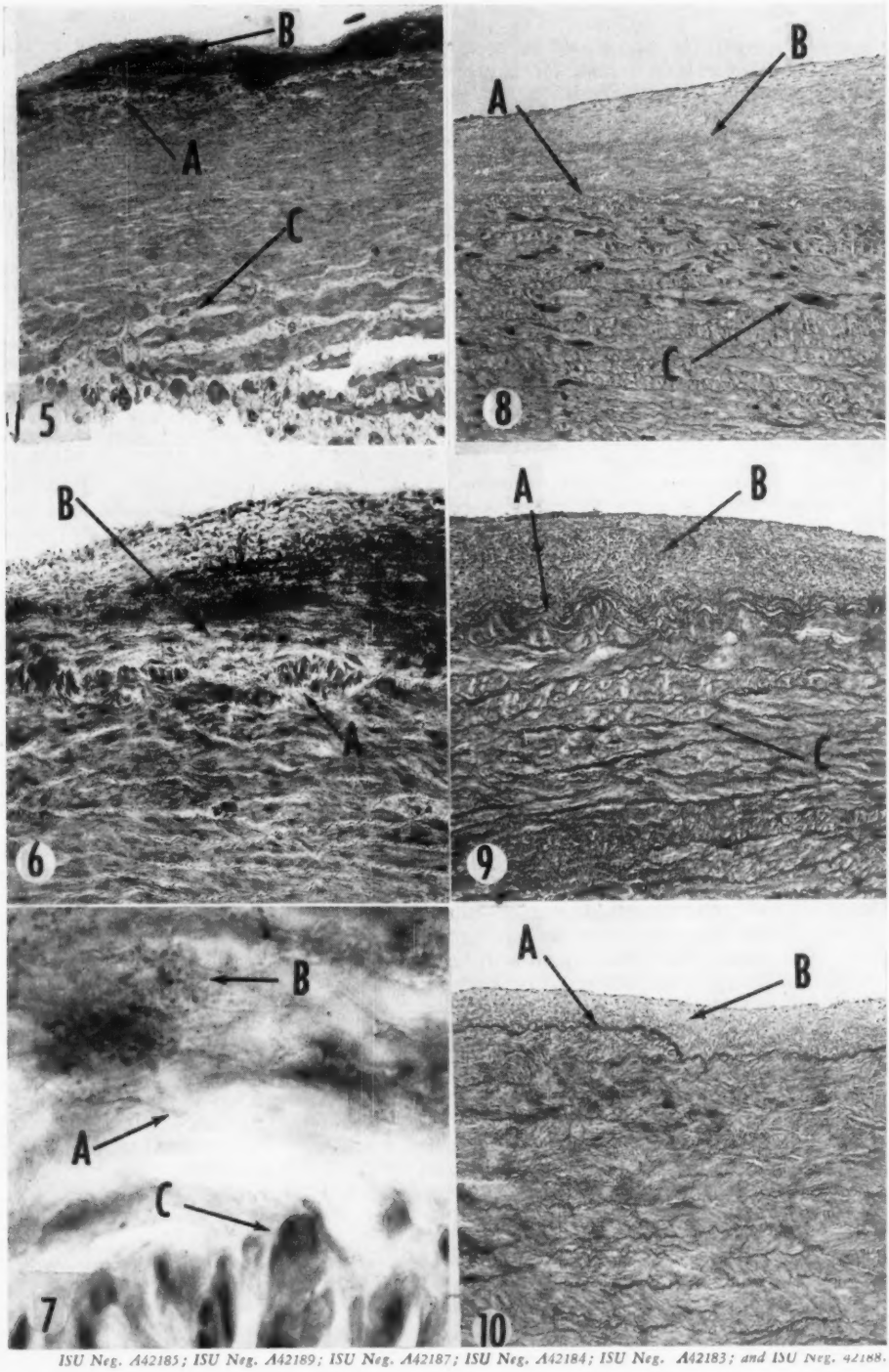
Fig. 6—Higher magnification of area in Figure 5. (A) internal elastic membranes showing disrupted cellular arrangement; (B) lipid deposits in the tunica intima. x 95; green filter.

Fig. 7—Higher magnification of the area shown by arrows in Figure 6. (A) internal elastic membrane; (B) intracellular and extracellular lipid droplets in the intima; (C) disrupted cells in the tunica media which appear to overlap in the frozen section cut at 15 μ. x 920; green filter.

Fig. 8—In a cross section of the abdominal aorta of sow (pig 20), there are seen smooth muscle fibers in the media and proliferation of macrophages in the intima: (A) internal elastic membrane; (B) proliferation of the intima; (C) dark-staining smooth muscle in the media. Mallory's aniline blue stain; x 95; green filter.

Fig. 9—Cross section of abdominal aorta of sow (pig 23): (A) disruption of the internal elastic membrane; (B) proliferation of the intima; (C) elastic fibers of the media. Weigert-Heidenhain-van Gieson stain (Getty's modification); x 95; green filter.

Fig. 10—Cross section of abdominal aorta of boar (pig 3): (A) internal elastic membrane; (B) proliferation of the intima. Weigert-Heidenhain-van Gieson stain (Getty's modification); x 95; green filter.



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sclerosis in man. The pig should serve as an excellent laboratory animal for future investigations of atherosclerosis.

Summary

Spontaneous atherosclerotic lesions similar to atherosclerotic lesions in man were found in 45 normal, apparently healthy swine.

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Third Human Death from Rabies

The third human death this year due to rabies was reported in Kentucky. The patient, approximately five weeks prior to death, had investigated a disturbance in his chicken house and found a fox there. While attempting to chase the fox away, he was bitten on his left thumb. The fox was killed and discarded. The man refused vaccination for rabies.

Within the next two weeks, 2 calves on the premises died, apparently from rabies. At this point, the man agreed to vaccination and was given 14 doses of duck embryo vaccine, the last, three days before onset of symptoms characteristic of rabies. He died four days later. Negri bodies were found on postmortem examination.—*Morbid. and Mortal. Rep., Public Health Service, USDHEW (July 7, 1961): 8.*

Observations on Eastern Equine Encephalitis in Maryland in 1959

R. J. Byrne, D.V.M., M.S.; F. M. Hetrick, M.S.; J. E. Scanlon, Ph.D.; J. W. Hastings, Jr., V.M.D.; L. N. Locke, D.V.M.

IN A PREVIOUS report, the history of equine encephalitis (EE) in Maryland was reviewed, and the 1956 epizootic was described.[2] No cases of the disease were observed in Maryland in 1957 and only one in 1958. The latter was the only confirmed case in a horse in the northeastern United States that year.

As nearly as could be determined, no attempts have been made in the past to conduct extensive epizootiologic studies for eastern equine encephalitis (EEE) in Maryland. The only data of epizootiologic significance have been made available through the Maryland State Live Stock Sanitary Service which has compiled mortality and morbidity records on the disease in horses, mules, and ponies. Until 1959, the virus of EEE had not been isolated from wild or domestic birds.

Failure to recover the EEE virus from arthropods in Maryland is probably a reflection of the scant number of attempts which have been made. The first recorded effort was that of the Department of Entomology, USDA, in which approximately 1,500 mosquitoes were collected during the 1933 epizootic.[7] Other unsuccessful attempts to recover virus from anthropods were made by the University of Maryland investigators in 1957 and 1958, both non-epizootic years.[2]

In the summer of 1959, one suspected case of EE was reported in August. The animal, a horse, had died under circumstances suggesting the disease; but unfortunately, no materials were made available for laboratory confirmation. The next suspect was observed around September 20, in the vicinity of Preston in Caroline County. A blood sample was collected from the dying horse, but it was not possible to obtain the brain for isolation studies and microscopic examination. Cases of disease continued to appear until around October 10. By then, there had been 17 fatal cases of EE in horses and ponies. Laboratory and clinical findings on these cases and results of concurrent epizootiologic studies are presented.

Dr. Byrne and Mr. Hetrick are with the Department of Veterinary Science and Microbiology and Dr. Scanlon with the Department of Entomology, University of Maryland, College Park; Dr. Hastings is a general practitioner in Cambridge, Md.; and Dr. Locke is with the U.S. Department of the Interior, Patuxent Wildlife Reserve Center, Fish and Wildlife Service, Laurel, Md.

Scientific article No. A912. Contribution No. 3253 from the Maryland Agricultural Experiment Station (Department of Veterinary Science).

Procedure

Virus Isolation Attempts.—Isolation attempts from equine brains and bird tissues were made as previously described.[2] Day-old chicks and weanling mice were employed as test animals. Chicks were given inoculations subcutaneously, whereas mice were given injections intracranially (i.c.). Collection, identification, processing, and testing of mosquitoes was conducted as described previously.[2] After the death of any mice or chicks inoculated with test materials, appropriate tissues were removed and suspensions prepared for subsequent passages. When an isolation was made, the agent was passaged further and identified by serologic means.

Serologic Tests.—Neutralization tests were conducted on heated undiluted serum combined with serial dilutions of virus. Adult mice, given inoculations i.c., were used as test animals. These tests were employed to examine serum specimens from field cases of EE as well as the serum from laboratory animals immunized for the purpose of typing viral isolates.

Fig. 1—Distribution of clinical equine encephalitis in horses and ponies in Maryland in 1959.

Hemagglutination-inhibition (HI) tests were conducted as previously described and used to examine serum from animals with clinical cases of EE as well as from laboratory animals inoculated with viral isolates.[1,3]

Virus Typing.—Preliminary virus typing was accomplished by injecting into 2- to 3-week-old chickens newly isolated agents. Hemagglutination-inhibition tests for EEE and western equine encephalitis (WEE) were then conducted on paired serums to demonstrate antibody response. Previous experience indicated that the HI response is sufficiently specific to differentiate the two viruses.[6] Final typing was done by cross-neutralization tests employing known EEE and WEE virus strains and immune serums.

Results

The number and distribution of cases of EE in horses and ponies was determined (Fig. 1). In general, disease was distributed as in prior epizootic years. Almost invariably, the sick horses or ponies were pastured animals on tidewater farms. There were no instances of EE in animals having a history of previous vaccination against EEE.

In those cases observed in which a relatively complete history was available, the period between the onset of central nervous system (c.n.s.) signs and death was about two to three days. At first, animals had a temperature of 103 to 105 F. which returned to normal or subnormal levels shortly before death. Typically, first signs were staggering, drowsiness, and depression. Paralysis of the tail, diminished cutaneous reflexes, yawning, and grinding of the teeth were frequent. One of the most valuable clinically significant signs was marked drooping of the lower lip. There was usually a marked tendency to lean against objects such as walls or fences. One horse was found dead on top of a wood pile where it had climbed in the terminal stages of the disease. Animals which were down and unable to rise often performed a steady running motion with their front legs and would dig circular holes in the ground before dying.

Results of laboratory tests on animals with field cases of EEE are given (Table 1). The detection of both neutralizing and HI antibodies for EEE at the time of death is compatible with previous laboratory and

TABLE 1—Summary of Laboratory Test Results on Specimens Obtained from Affected Horses in Maryland in 1959

Animal No.	County	Time	Serology		Examination of brain	
			Neut.*	HI	Virus isolation	Histopathologic lesions
1	Caroline	Sept.	1.0	1:320	.....**	.....
2	Dorchester	Sept.	3.0	1:1,280	Yes	Yes†
3	Somerset	Sept.	1.9	1:160	No	.....
4	Caroline	Oct.	1.4	1:2,560	Yes	Yes
5	Talbot	Oct.	1.9	1:320	.....	.....
6	Worcester	Oct.	2.4	1:640	.....	.....
7	Worcester	Oct.	1.8	1:2,560	.....	.....

*Log$_{10}$ of neutralization indexes; **not available for testing; †=lesions compatible with virus encephalitis.

field observations made by this and other laboratories.[3,8] The very short interval of time between first signs of clinically recognizable disease and death precluded the opportunity of obtaining properly spaced serum samples with which to demonstrate a rise in antibody titer. Only in one animal, case 4, was it possible to obtain two specimens, one on the day before death and a second at the time of death. Hemagglutination-inhibition tests on both samples gave identical results, *i.e.*, positive at 1:2,560 for EEE.

As a result of reported losses of English sparrows (*Passer domesticus*) in the Laurel-Beltsville area of Maryland, birds were collected and examined at the Patuxent Wildlife Research Center in Maryland. Spleens from captured sparrows were sent to the Grayson Laboratory, University of Maryland, for virus isolation studies. From one pool of spleens, obtained from apparently normal sparrows, a transmissible agent was isolated and subsequently identified as EEE virus. A more detailed description of sparrow losses in Maryland in 1959 is reported elsewhere.[4]

An epornitic of disease in chukar partridges due to EEE virus occurred in Wicomico County in late September, 1959.[5] This chukar epornitic was observed in an area where horse and pony cases were being reported at the time. In contrast, the infection in sparrows was detected in a region where the horse disease was relatively rare.

The data on mosquito collections are given (Table 2). In addition to the mosquitoes, a biting fly, *Stomoxys calcitrans* (common stable fly), was taken from a dying horse and examined for virus. There were no viruses isolated from any of the arthropods examined.

TABLE 2—Laboratory Examination of Mosquitoes for Virus of Eastern Equine Encephalitis in Maryland from Sept. 25 to Oct. 10, 1959*

Mosquito species	No. tested	No. of pools
Aedes atlanticus (Dyar and Knab)	45	2
Aedes mitchellae (Dyar)	1	1
Aedes sollicitans (Walker)	111	5
Aedes taeniorhynchus (Wied.)	10	1
Aedes vexans (Meigen)	107	4
Anopheles crucians Wied.	21	2
Anopheles punctipennis (Say)	1	1
Anopheles quadrimaculatus Say	15	1
Culex pipiens Linn.	4	1
Culex salinarius Coqu.	197	6
Psorophora ciliata (Fabr.)	6	2
Psorophora confinnis (Lynch Arrib)	62	5
Total individuals	580	Total pools 31

*Collections were made in Caroline, Dorchester, Somerset, and Talbot counties; EEE virus was not isolated from any specimen.

Discussion

It is evident from the observations made in this study and from those made previously that EEE is a late summer disease in Maryland and primarily confined to tidewater sections. Although there have been occasional reports of EE in vaccinated horses, there is usually a history of failure to keep up with the manufacturer's recommended schedule. In other instances, deaths in properly vaccinated horses have not been confirmed in the laboratory as EE. In short, annual EEE immunization of horses and ponies along the Atlantic seaboard is highly recommended. Use of bivalent vaccines is indicated in animals likely to be transported to other areas where WEE is also prevalent.

Although the isolation of EEE from birds was the first of its kind in Maryland, it is quite possible that avian infection and disease have been missed in the past simply by not being sought out. The widespread dying off of English sparrows in late summer has been observed for a number of years and, in retrospect, these avian epornitics have coincided with the disease in horses.

Epornitics of the disease in pheasants, such as seen in New Jersey and other Middle Atlantic and southern New England states, have not been observed in Maryland since these birds are not raised here on the same scale as in the areas to the north. For reasons not completely understood, released pheasants do not propagate or survive long in the Chesapeake Bay region. Therefore, unvaccinated horses and ponies are the chief sentinals heralding presence of the virus or start of an epizootic.

Failure to isolate virus from arthropods can best be attributed to small collection numbers. The time and place of collections were such as to afford the opportunity to make isolations. The significance of the numbers factor is evident from the fact that EEE virus was isolated from arthropods in New Jersey during the period that the disease was evident along the northeastern Atlantic coast. New Jersey mosquito collections were carried out on a considerably

larger scale than that attempted in Maryland.

Summary

During 1959, there were at least 17 fatal cases of equine encephalitis among Maryland horses and ponies. All these cases were observed in the southern counties on Maryland's eastern shore, between September 20 and October 10. Seven cases of the disease were confirmed in the laboratory. During the epizootic in horses, eastern equine encephalitis virus was isolated from English sparrows collected near Baltimore. Attempts to isolate virus from mosquitoes were unsuccessful.

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Vitamin K_1 and Transfusion Useful Warfarin Therapeutics

The treatment of warfarin poisoning in the dog can be materially aided by using massive transfusion of whole blood, especially if the red blood cell count is less than 2,000,000/cmm.

To prevent over-transfusion and consequent pulmonary edema, removal of large volumes of blood from the circulation while transfusing blood containing normal clotting factors is practical.

Intravenous or oral administration of vitamin K_1 is a rapid and effective antidote to warfarin poisoning. The administration of water-soluble analogues of vitamin K is of doubtful value. In the absence of whole blood, the administration of vitamin K_1 may be adequate by itself. — *Vet. Rec., 73, (June 3, 1961): 551.*

Experimental Treatment of Ovine Vibriosis

J. F. Ryff, D.V.M., and Harold Breen, D.V.M.

SEVERAL REPORTS on the experimental use of antibiotics in vibriosis of sheep have appeared in the veterinary literature. Feeding of chlortetracycline prior to experimental exposure to *Vibrio fetus* markedly reduced the abortion rate from 61% seen in a control group to 18% and 10% in two lots of treated ewes.[1]

Significant reductions in the rate of abortion among pregnant ewes, orally infected with *V. fetus*, resulted from feeding 80 mg. of tetracycline per ewe daily from 27 days prior to inoculation until they lambed. Significant reductions in abortion also resulted after treatment with two daily injections of penicillin and dihydrostreptomycin on postinoculation days 5 and 6 plus daily feeding of 80 mg. of chlortetracycline per ewe from postinoculation day 5 until lambing.[2]

In two flocks with enzootic vibriosis, 80 mg. of chlortetracycline hydrochloride in the feed, 2 intramuscular injections of procaine penicillin and streptomycin on consecutive days, or both treatments together, were tried. About 85 to 95% of the ewes in the treated groups bore live lambs compared with 76 to 78% in the untreated groups.[3]

A single intramuscular dose of tetracycline (0.25 to 1.0 Gm. per ewe) in a natural epizootic was followed by 68% of 32 treated ewes aborting as compared with 46% in 67 untreated controls. In two other natural epizootics that were nearly terminated, 1 Gm. of oxytetracycline intramuscularly was followed by 2.5% of 74 treated ewes aborting as compared with 6.7% of 140 controls; 1 Gm. of streptomycin intramuscularly, by 1.0% of 187 treated ewes and 0.9% of 776 controls.[4]

In Wyoming, epizootics of vibrionic abortion have occurred so sporadically that prophylactic medication has not been justified. Many operators delay seeking assistance until the disease is well established. The additional time needed to establish bacterial diagnosis after abortion emphasizes the necessity of continued efforts to develop a treatment that might have value in curtailing abortions.

Procedure and Results

Results secured over several years are summarized (Table 1). In each flock, *V. fetus* was recovered from 1 or more aborted lambs before treatment was instituted.

In flock 1, 30 lambs had been aborted among 500 ewes, and *V. fetus* had been isolated from 1 of 2 lambs submitted, when arrangements were made to separate two groups of 25 ewes for treatment. No further abortions occurred in either of these treated groups; also, there were no abortions in the 300 ewes available as controls. Although no pertinent information as to efficacy of treatment can be derived from this self-limiting infection, it is included to illustrate one problem encountered in working with ovine vibriosis.

In addition to flock 1, intramuscular oxytetracycline was used in flocks 2, 3, 5, and 6. When the treated group was held separately from the controls, the percentage of abortions for the treated and control groups, respectively, was: 10.0% and 22.5%, 0% and 5.7%. Where the treated sheep were left in with the controls, 19.0% and 32.1% abortions occurred in the treated ewes as compared with 2.8% and 42.0% in the controls.

Streptomycin was used in flocks 1 and 4. Using various levels of dihydrostreptomycin as a single treatment, 36.3%, 20.0%, and 36.3% of the treated ewes aborted as compared with 45.4% abortions in the untreated controls. The repository type of

From the Wyoming State Veterinary Laboratory, Laramie.

Supplies of terramycin were made available by Chas. Pfizer & Co., Inc., New York, N.Y., and of repository streptomycin and sulfabromomethazine by Merck Sharp and Dohme, Rahway, N.J.

TABLE 1—Results of Study of Abortion in Ewes due to *Vibrio fetus*

	Status of flock at start of trial					Treated group						Control group			
	Flock	Sheep	Abortions		Management of	Sheep	Abortions		Management of		Sheep	Abortions		
Year	No.	(No.)	(No.)	(%)	aborting ewes	(No.)	(No.)	(%)	aborting ewes	Treatment	(No.)	(No.)	(%)	Management
1957	1	500	(30)*	....	Left in flock.	25	0	.....	Separated.	1.0 Gm. streptomycin daily, 4 days.**	300	0	.....	.....
						25	0	.....	Separated.	1.0 Gm. terramycin daily, 4 days.				
	2	60	5 (7)		Removed prior to aborting.	30	3 (5)	10.0	Separated.	0.5 Gm. terramycin, 5 days.	31	7(7)	22.5	.....
	3	248	8 (16)	....	Removed prior to aborting.	30	0	.....	Separated.	1.0 Gm. terramycin daily, 3 days.	210	(12)	5.7	.....
1958	4	121	28	....	Left in flock; removed later.	11	4	36.3	Not separated.	4.0 Gm. dihydro-streptomycin.	35	16	45.4	.....
						10	2	20.0	Not separated.	2.0 Gm. dihydro-streptomycin.				
						11	4	36.3	Not separated.	1.0 Gm. dihydro-streptomycin.				
	5	165	5	....	Left in flock.	21	4	19.0	Not separated.	1.0 Gm. terramycin daily, 4 days.	139	4	2.8	.....
	6	216	51	....	Left in flock.	28	9†	32.1	Not separated.	2.0 Gm., 1.0 Gm., 1.0 Gm. of terramycin daily.	119	50‡	42.0 (estimated)	.....
											323	60	18.5	.....
	7	400	43	....	Left in flock.	34	3	8.8	Not separated.	4.0 Gm. repository streptomycin.	15	6	....	Common water supply with 8B.
	8A	15	0	....	Left in flock.	.....	....	.....	.....	.....				
	8B	15	1	....	Left in flock.	.....	....	.....	.....	.....	15	9	....	Common water supply with 8A.
	8C	15	3	....	Left in flock.	.....	....	.....	.....	.....				
	8D	15	1	....	Left in flock.	.....	....	.....	.....	.....	15	7	....	Common water supply with 8D.
	8E	15	0	....	Left in flock.	.....	....	.....	.....	.....	15	5	....	Common water
	8F	15	0	....	Left in flock.	15	0	.....	.....	4.0, 4.0, 3.0 Gm. repository strepto-mycin at 48 hr. intervals.	15	6	....	supply with 8C. .....
											....	....	....	Common water supply with 8G.
	8G	15	0	....	Left in flock.	.....	....	.....	.....	.....	15	5	....	Common water supply with 8F.
	8H	15	4	....	Left in flock.	.....	....	.....	.....	.....	15	7	....	Common water supply with 8I. except during treatment.
	8I	15	5	....	Left in flock.	10	1 (after treatment)	10.0	.....	1.0 Gm. terramycin/ ewe in water daily for 9 days.	....	...	....	Common water supply with 8H except during treatment.
	8J	15	0	....	Left in flock.	.....	....	.....	.....	.....	15	5	....	.....
1959	9	725	(27)	....	Left in flock.	60	3	5.0	Not separated.	4.0 Gm. repository streptomycin.	651	101	15.5	.....
	10	258	(10)	....	.....	30	0	.....	Not separated.	180.0 gr. sulfabromo-methazine orally.	156	(5)	3.2	.....
1960	11	300	(50)	....	Left in flock.	41	5 (7)	12.1	Not separated.	157.0 gr. sulfabromo-methazine orally.	146	15 (19)	10.2	.....
Total	....	3,143	225	7.1	.....	381	38	9.9	.....	.....	2,230	320	14.3	.....

*Numbers in parentheses are the number of lambs aborted; numbers not in parentheses are the number of ews aborting. **Treatment given intramuscularly except when marked otherwise. †Aborting or barren ewes. ‡Out of a total of 82 aborting or barren ewes.

streptomycin was utilized in flocks 7, 8, and 9. In flocks 7 and 9, the results for the abortions recorded for the treated sheep in contrast to the untreated ones were 8.8% compared with 18.5% and 5.0% compared with 15.5%.

In flock 8, the University of Wyoming had set up a feeding trial in duplicate so that ten small lots, in each of which there were 15 ewes, were available. Eight of these lots were situated so that a common water supply was available to each adjacent pair of pens. When 15 abortions had occurred and *V. fetus* had been isolated from some of these aborted lambs, experimental treatments were tried in pens 8F and 8I.

Three injections of the repository streptomycin product were given at 48-hour intervals to ewes in pen 8F. These 15 ewes had not yet had any abortions. Ewes in pen 8G, sharing the water supply with pen 8F, also had had no abortions to this time. No abortions occurred in the streptomycin-treated ewes in pen 8F, although, in adjoining pen 8E, 5 ewes aborted. Similarly, ewes in two adjoining pens (8I and 8H sharing a common water supply) had four and five abortions, respectively. At this time, pen 8I was supplied with oxytetracycline in the drinking water, 1 Gm. daily per sheep for nine days. In this treated group, there was one further abortion after treatment had been started, whereas three occurred in the control lot adjoining it. As can be seen (Table 1), ewes in all these ten pens had abortions except for those in pen 8F, the one given the repository streptomycin product. Fifty abortions (a rate of 41.6%) occurred compared with no abortions for the streptomycin-injected ewes and 10% abortions in the oxytetracycline-treated ewes.

In the two flocks (10 and 11) in which ewes were given sulfabromomethazine orally as a single dose, no abortions (flock 10) and 12.1% (flock 11) occurred in the treated ewes contrasted to 3.2% (flock 10) and 10.2% (flock 11) in the untreated sheep.

Although these results are not always directly comparable (in some cases, abortions were tallied as the number of ewes aborting; in others, as the number of aborted lambs), individual treated and control groups were reported identically. These experimental results over a four-year period involved 3,143 head and, at the time the experimental therapy was begun, 225 abortions (7.1%) had occurred. A total of 381 ewes were set aside for different types of therapy, and of these 38 (9.9%) aborted. Along with these treated sheep, 2,230 were available as controls, and 320 abortions (14.3%) were reported here.

Discussion

One might be prone to apply statistical analysis to prove the point that treatment in the face of an abortion storm could be expected to be useful. However, after observation of epizootics of vibrionic abortion in sheep over a number of years, there seems to be a biological entity that is undoubtedly affected by many unseen factors. One of the more obvious factors could be placed under the general heading of management. It has been apparent that skillful handling of these situations might have kept abortions to a minimum. Different individuals given the same directions for sanitary measures during an epizootic will obtain a wide variation in results. For instance, one will anticipate abortions and remove such ewes from the flock before the act occurs. Another individual will claim that such ewes cannot be detected and will even maintain that some cannot be found readily after abortion occurs.

In any treatment procedure, this same feature may be expected to affect results. In addition, a single application of an effective agent should be useful when applied during the incubation stage of the disease. Also, if the ewe was exposed while the treatment was still effective, one might assume beneficial results would occur. Limited treatment applied in the late incubation stages when the disease was in the ascendency or had progressed to an active process might not be of much help. If the drug were supplied to the ewe which had not been exposed and which was not exposed while the drug was in an effective concentration, one could hardly expect any beneficial results when exposure occurred later. One or several or all of these factors might be present at the time of treatment.

Even with these points in mind, one of the most effective of these treatments was the one designated as a repository streptomycin preparation.* Unfortunately, this product was difficult to handle because it

*An experimental resin-adsorbed streptomycin, supplied by Merck Sharp and Dohme, Rahway, N.J.

rapidly settled out, and it was also irritating and produced an obvious lameness in some inoculated sheep. Given experimentally to sheep under general anesthesia as deep intramuscular inoculations, this lameness did not occur. Possibly its appearance in the field was due to a more superficial type of injection. However, with the deep injections, localized muscle necrosis at the inoculation site was evident a month later when the sheep were killed.

Rapid absorption and subsequent rapid elimination was probably the greatest disadvantage of the other products used. In most field epizootics it would not be practical to repeat the injections.

Summary

Over a four-year period in selected flocks of sheep in which a definite diagnosis of *Vibrio fetus* abortion had been made, streptomycin, oxytetracycline, and a repository streptomycin were given by intramuscular injections, and sulfabromomethazine and oxytetracycline were given orally. Except for consistently good results with the repository streptomycin, results were variable. However, during an epizootic some over-all benefit was secured from therapy with any of these agents.

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Progressive Posterior Paralysis (Crampy) in Bulls May Be Genetic

Records from 12,387 dairy bulls of 5 breeds, and 448 beef bulls of 4 breeds, were studied to determine the frequency and age at occurrence of progressive posterior paralysis and to determine if genetic influence existed. Representing all 9 breeds, there were 323 dairy and 10 beef bulls affected. Death or the last effective services of affected bulls occurred at a mean age of 10 years. Numerous familial relationships were demonstrated, strongly indicating a genetic background for the condition. The inheritance factor was believed to be a single recessive with incomplete penetrance.—*J. Dai. Sci., 44, (March, 1961):542.*

Pulmonary Emphysema in Cattle

J. E. Moulton, D.V.M., Ph.D.; J. B. Harrold, B.S.; M. A. Horning, D.V.M.

ACUTE BOVINE pulmonary emphysema, also called bovine asthma, summer snuffles, hay fever, panting disease, pulmonary edema, and fog fever (Great Britain), has been reported in the United States,[5,10,16] Canada,[12,13] Great Britain,[1,3,4,6-8] France,[9,11] and the Netherlands.[15] Now one of the most important respiratory diseases of cattle, it appears to be increasing in the western United States.

Literature Review

From published reports and the minutes of the pulmonary emphysema meeting* at Sheridan, Wyo., Sept. 3-4, 1959, the general features of pulmonary emphysema in cattle can be stated as follows. Pulmonary emphysema is usually limited to cattle 3 years old or older but occurs occasionally in yearlings and rarely in calves. Both dairy and beef breeds are affected; there is no breed predilection. Although the disease is found in steers and bulls, most commonly affected are mature prelactating or lactating cows, particularly those that have recently calved or are about to calve. It has not been observed in the calves of affected cows.

The disease is usually seasonal, from July to November, but has occurred throughout the year. When it appears in September or October, it often subsides after the first severe frost.

Pulmonary emphysema occurs after a drastic change in feed, usually a change from short, dry, overgrazed pasture to irrigated, improved pasture containing good regrowth of forage. It also occurs after a change from low to high grain supplementation, and in cattle brought into feedlots. The disease often affects thrifty, good-foraging cattle.

No particular type of forage is responsible; alfalfa, grain stubble, meadow grasses, kale, and rape have all been incriminated. After moving to better forage, cattle become sick in four to ten days. This latent period is fairly constant in individual instances. The disease is characterized by a rapid course, usually 24 to 48 hours. Cattle that recover from the acute condition sometimes develop chronic manifestations. Morbidity, which varies greatly in different epizootics and within the same herd in separate years, ranges from 1 to 100% Mortality varies from 5 to 35%.

Affected cattle are lethargic; they stand with their heads lowered and extended, and they have shallow, increased respiration; the expiratory dyspnea is accompanied by a short grunt. There is rapid pulse, normal or slightly elevated body temperature, sometimes ruminal tympany, slowed peristalsis, and either constipation or diarrhea. Milk secretion and appetite are usually normal until late in the course of the disease. Subcutaneous emphysema is sometimes observed in the cervical area, withers, dorsal thorax, and lumbar area.

On necropsy, there are distention of the lungs and severe interstitial emphysema. The lungs are firm, rubbery, and darker pink than normal. Edema with froth is sometimes seen in the tracheobronchial passages. Pale, friable liver and catarrhal gastroenteritis have been described.[13] Histologically, the pulmonary alveoli are overdistended and sometimes edematous. Proliferation of alveolar epithelial cells and infiltrations of neutrophils or eosinophils have been observed also.[4,12,15] One report mentioned hypertrophy of bronchial and vascular musculature[16]; another, necrosis of renal epithelium and increased mucus in the digestive tract.[12]

The cause of pulmonary emphysema is unknown. Suggested causes are toxins of bacterial origin, particularly toxins of *Clostridium perfringens*, and anaphylaxis following absorption of foreign proteins from the feed.[5,9,13,15,16] Also mentioned as causes are lungworms, infectious agents, altered drinking water, spiders or gossamer, moldy feed, and nitrates.[1,2,8,10]

Treatment of sick animals has been unsuccessful; drugs such as epinephrine and antihistamines and various bacterins have not altered the course of the disease.[1,12] Cows with mild cases probably recover spontaneously. Prevention of pulmonary emphysema by feeding hay or straw before the cattle are moved to lush pasture has been successful in some instances.[13]

This report describes the herd history and clinical and pathologic manifestations of an epizootic of pulmonary emphysema in California.

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*The authors thank Dr. J. O. Tucker, Department of Veterinary Science and Bacterio'ogy, University of Wyoming, Laramie, for supplying a copy of these minutes.

The authors acknowledge the assistance of Drs. D. L. Dungworth and H. J. O'ander in performing necropsies, and of Miss M. E. Wada in tissue culture work. Dr. C. E. Cornelius cooperated in the hematology and blood chemistry studies, and Dr. M. Shifrine tested for histamine. Mr. B. Crampton identified the grasses and seeds, and Dr. W. P. C. Richards assisted in the antigen sensitivity tests. We especially thank Mrs. D. Devine who aided in the bacteriologic and toxin studies.

Herd History

Pulmonary emphysema was observed on the ranch for at least two years preceding the epizootic. Forty cattle died in 1958, and 30 in 1959. The incidence before 1958, which is not recorded, was probably not as high. The ranch is near Alturas, Modoc County, in northeastern California. The disease was also found on other ranches in the area, two of them adjoining this one.

Management of the cattle on this ranch was as follows. The cattle, driven in from dry range in the fall, were grazed on irrigated meadows until late December when the feed became poor, then they were moved and fed hay. They were returned to the meadows in April after the ground had dried and were moved back to dry range later in the spring. After the cattle were gone, the meadows were flood-irrigated and a crop of hay was raised. The pasture was irrigated and fertilized with nitrogen compounds before introduction of cattle again in the fall. Most cattle were driven about 50 miles from the range to the meadows, whereas some were brought down from hills directly adjacent to the meadows. Feed along the trails where the cattle were driven was minimal, and they arrived hungry. Once on the meadows they engorged themselves rapidly on green grass. Drinking water was ample the year around.

This ranch has about 5,000 cattle and the herd was largely self-contained except for imported bulls used in natural breeding. The cattle had a few lice, ticks, and flies which were controlled by spraying. Mosquitoes were numerous during the warm months. The important infectious diseases in this area were blackleg, bacillary hemoglobinuria, and malignant edema, all controlled by vaccination. Pneumonia, coccidiosis, and fascioliasis were observed sporadically.

Emphysema appeared exclusively during October. Cattle developed the disease ten days after coming onto the meadow, with only a few cases occurring in less time. The disease was sudden and progressed rapidly. Among 250 cattle in one pasture, 25 were sick; 14 of these died in five days. On a different pasture in a herd of 300, 15 became sick and six died in two days. Respective morbidity was 10% and 5%. About half the sick cattle died in each epizootic.

Placing cattle on stubble or feeding hay has lowered the incidence of pulmonary emphysema on this ranch. In an adjoining pasture containing 1,000 cattle previously fed on stubble for two weeks, only three became sick and all recovered.

Pulmonary emphysema on this ranch affected the adult and aged stock, usually those 7 to 8 years old. Both sexes were involved, but usually pregnant cows or cows nursing calves were affected. There was a high incidence in cows because all male stock was sold.

The disease was observed on another ranch in this area in 5 of 12 bulls brought two weeks earlier from Nebraska. These bulls were fed hay and ground barley and had no access to meadow grass.

The course of the disease usually varied from one to four days. Affected cattle had rapid pulse rates, severe dyspnea, small periodic coughs, and increased, shallow respiration, with expiratory dyspnea. Early in the course of disease, cattle sometimes had tightness and twitching of the nostrils. An affected cow would stand with head lowered and extended. Body temperatures, obtained for 14 cows, varied between 101 and 104 F., but there was no consistent pattern. Death occurred rapidly in some cattle; unless they were observed at early stages, they were found dead. Cattle lay down and died with no struggling.

Materials and Methods

Necropsies were performed on 6 cows. Most of the tissues for microscopic study were fixed in 10% formalin solution; lung tissues from one were fixed in Zenker's fluid. Tissues sections, 6 μ thick, were stained with hematoxylin and eosin. Selected lung tissue sections, at 50 and 100 μ thick, permitted a three-dimensional view of the alveolar wall. Special stains used on lung tissue sections were van Gieson's, Giemsa's, and Gram-Weigert's stains; Orcein's and Verhoeff's elastic fiber stains; Pollack's trichrome stain; and Foot's modification of Bielschowsky's reticular fiber stain.

Case Reports

Cow 1.—This aged Hereford cow was killed by gunshot, exsanguinated, and necropsied immediately.

Gross Pathologic Findings.—The nutritional state was good. Emphysema, in the form of small gas blebs, was observed in the region of the vertebrae anterior to the kidneys.

The mediastinum contained large gas pockets. White froth was found in the lower trachea and bronchi. The lungs were uncollapsed, and there was extensive interstitial emphysema (Fig. 1 and 2). The lung lobules were pale pink or red, firm, noncrepitant, and friable. Fluid could be expressed from cut surfaces.

The pericardial sac contained 10 ml. of clear, yellowish fluid; the epicardium had multiple, reddish streaks over the left ventricle. The left stifle and right hock joints each contained approximately 3 ml. of clear, yellow-tinged fluid.

Histopathologic Findings.—Reticular cells were prominent in the germinal centers and around the malpighian corpuscles of the spleen. One kidney had multiple mononuclear cell foci in the cortex, and both kidneys had necrosis of epithelial cells in the collecting tubules.

The most remarkable histologic change

Fig. 1—Cross section of diaphragmatic lobe of the lung of a cow with emphysema. One third of the lung specimen is lighter colored than normal. The affected part has darker colored lobules separated by emphysematous septums. Large bullae are observed in some areas.

was the presence of cuboidal cells in the pulmonary alveoli (Fig. 3). Some alveoli had only a few of these cells along the alveolar wall, others had cells free in the lumen or forming a continuous lining in the alveoli, separating the alveolar lumen from the capillary blood. The cells were round or ovoid, had round centrally placed nuclei, and dark pink cytoplasm. Some had hyperchromatic nuclei, prominent nuclei, and mitotic figures. Cells detached from the wall sometimes clustered together, 4 to 12 in number, resembling giant cells. Because alveolar cuboidal cells had origin in the alveolar walls and morphologically resembled epithelial cells, they are hereinafter called "alveolar epithelial cells." Many alveoli contained eosinophils varying in number from 5 to 20.

Mast cells, averaging one cell for every two oil-immersion fields, were observed in the alveolar walls in sections stained by Giemsa's method. Vacuolated, pink-staining, edematous fluid and fibrin were found in many alveoli, with or without accompanying epithelial cells (Fig. 3 and 4). The fibrin either formed a layer adjacent to the alveolar wall or appeared in clumps within the lumen, often partly surrounded by epithelial cells.

Some alveoli contained erythrocytes; others had macrophages filled with hemosiderin. Some lobules had only dilated and ruptured alveoli (Fig. 5). Other lobules had transitions between dilated alveoli and alveoli with edema, fibrin, and epithelial cells. Large bullae were formed by rupture of alveoli into one another. The septums of expanded alveoli were thin, and the capillaries were often collapsed and ischemic. In ruptured alveolar walls the capillaries were constricted and hemorrhage was minimal.

Thick sections (50 and 100 μ) of emphysematous lung tissue had single large fenestrations in alveolar walls, whereas sections of normal lung tissue had intact

Fig. 2—Lung with emphysematous interlobular septums, some with beadlike areas of air. Lobules appear solid.

alveolar walls with no fenestrations. Sections stained for reticular and elastic fibers had distortion of fibers where fenestrations occurred but no other changes.

Another prominent change in affected lungs was accumulation of air and edematous fluid in interlobular septums. A few lobules had alveoli that had ruptured directly into these septums. This air, and to a lesser extent edematous fluid, widened the interlobular septums and separated the cellular elements there. Eosinophils, sometimes 50 per high-power field (x 450), were prominent in emphysematous septums.

The bronchioles and bronchi were usually normal but sometimes contained edematous fluid and eosinophils. Except for capillary hyperemia in areas of alveolar edema and fibrin deposition, the blood vessels of the lung were normal.

The bronchial lymph nodes had eosinophils in the sinuses. All lymph nodes had a mild degree of reticular-cell hyperplasia in the sinuses and lymph follicles.

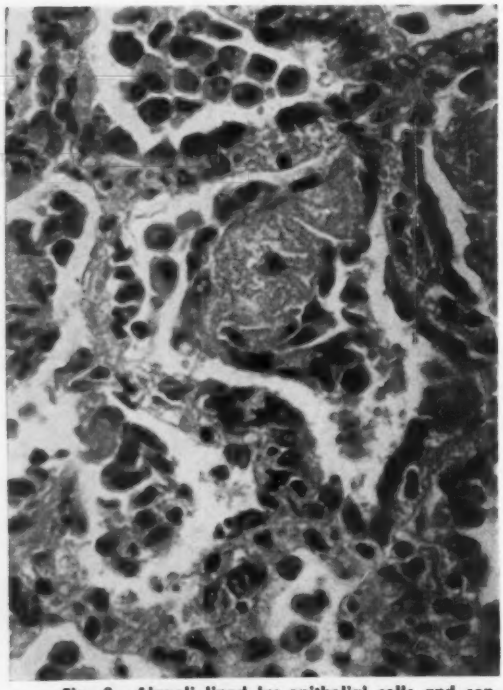

Fig. 3—Alveoli lined by epithelial cells and containing detached epithelial cells and fibrin in the lumens. Lung tissue of this type accounts for the semisolid character of the lobules seen grossly. x 400.

Cow 2.—This Hereford cow, 9 years old, was killed by gunshot, exsanguinated, and necropsied immediately.

Gross Pathologic Findings.—The nutritional state was good. No subcutaneous emphysema was present. Approximately 500 ml. of clear, yellowish, watery fluid was in the peritoneal cavity.

Many large gas pockets were found in the mediastinum and overlying the pericardium. A small amount of white froth was observed in the lower trachea and bronchi. The lungs were enlarged and uncollapsed, and they had severe interstitial emphysema. The lung lobules varied from pale salmon-pink to red and were firm, noncrepitant, and friable. The lung tissue incised cleanly, and white froth could be expressed from cut surfaces. The pericardial sac contained 10 ml. of clear, yellowish fluid. The lymph nodes in the thoracic cavity were slightly enlarged. The intermuscular fascial planes were edematous, particularly in the hindquarters. The hock joints had increased synovial fluid; other joints were normal.

Histopathologic Findings.—The spleen had hyperplasia of reticular cells around malpighian corpuscles and in germinal centers. The kidneys contained scattered calcium plaques in the medullary portions; one kidney had small mononuclear-cell foci and scars in the cortex.

The lung changes were similar to those in cow 1. Some lobules were found to have emphysema without other change; others had epithelial proliferation, edema, and fibrin deposition. Early alveolar changes were clearly demonstrated in this lung. Many dilated alveoli had thin walls with collapsed ischemic capillaries. The ends of the ruptured alveolar walls were either frayed or smooth in contour. No specific changes were observed in the endothelial cells. Eosinophils were numerous within the alveoli.

The bronchial lymph nodes had numerous eosinophils in the sinusoids and emphysema.

Cow 3.—This Hereford cow had died five hours before necropsy.

Gross Pathologic Findings.—The nutritional state was fair. There were several fibrous adhesions up to 10 cm. in diameter between the diaphragm and liver. The pharynx had multiple ecchymotic hemorrhages.

There were several large hemorrhages in the interlobular areas of the diaphragmatic lobes. Petechial and ecchymotic hemorrhages were throughout the tracheobronchial tract. The lungs, which had not collapsed, were enlarged except for the anteroventral lobes, which were sunken, firm, and gray. The lobules were well separated by intersititial emphysema.

Ecchymotic hemorrhages were found in the adventitia at the root of the pulmonary artery. The prescapular and bronchial lymph nodes were dark red and moist.

Histopathologic Findings.—There were submucosal edema and hyperemia in the mouth. The liver had a thick, fibrous capsule. Lung changes were similar to those in cows 1 and 2, although atelectasis was more extensive, particularly in the anteroventral lobes.

The bronchial lymph nodes had eosinophilic infiltration and interstitial emphysema. A prescapular node had marked cortical hyperemia.

Cow 4.—This Hereford cow died naturally, 24 hours before necropsy.

Gross Pathologic Findings.—Because of the low environmental temperature, postmortem change was minimal. The nutritional state was fair. The pharynx had scattered ecchymotic hemorrhages. The gallbladder and major bile ducts of the liver were enlarged and contained a thick, green, tenacious secretion, a few flukes, and much gritty material.

There were many linear hemorrhages and a small amount of fluid in the tracheobronchial tract. Blebs of gas were prominent under the pleura in the interlobular septums. The lungs were enlarged and appeared similar to those in the other cows. Emphysema was extensive in the loose tissue overlying the pericardium. The prescapular lymph nodes were moderately enlarged, moist, and dark red.

Histopathologic Findings.—The liver was found to have fibrous thickening of the capsule, portal fibrosis, and bile-duct hyperplasia. Sections of lung tissue had predominantly alveolar and interstitial emphysema, with less alveolar epithelial cell proliferation than in the other cows. Many alveolar epithelial cells were swollen and vacuolated with eccentrically placed nuclei. The lungs had scattered areas of atelectasis. There were focal collections of lymphocytes around some of the bronchioles. Eosinophils were located around some of the arteries and within alveoli and interlobular septums. The bronchial lymph nodes had changes similar to the other cases.

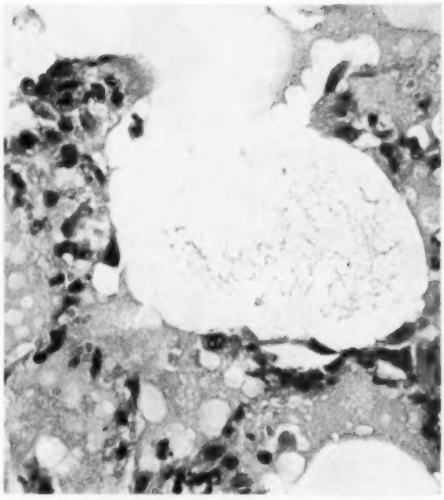

Fig. 4—Emphysematous lung with a large ruptured alveolus in the center surrounded by a number of alveoli containing edematous fluid. Small bubbles of air are trapped in the edematous fluid. x 265.

Cow 5.—This aged Hereford cow died three hours before necropsy.

Gross Pathologic Findings.—The postmortem state was excellent; the nutritional state was fair.

The pharyngeal mucosa had numerous petechiae. The tracheobronchial walls had scattered petechiae and a small amount of pink fluid. The left lung was collapsed because the left pleural sac was partly occupied by a massive gaseous distention of the mediastinum. The right lung was large and uncollapsed. The interstitial septums of both lungs were widened by areas of emphysema, in some areas up to 10 cm. in diameter. The pulmonary lobules were firmer than normal and dark pink.

Extensive emphysema was observed over the pericardium. Ecchymotic hemorrhages surrounded the root of the pulmonary artery.

The retropharyngeal, prescapular, and mandibular lymph nodes had cortical hyperemia and petechiae.

Histopathologic Findings.—The lungs had severe interstitial emphysema, edema,

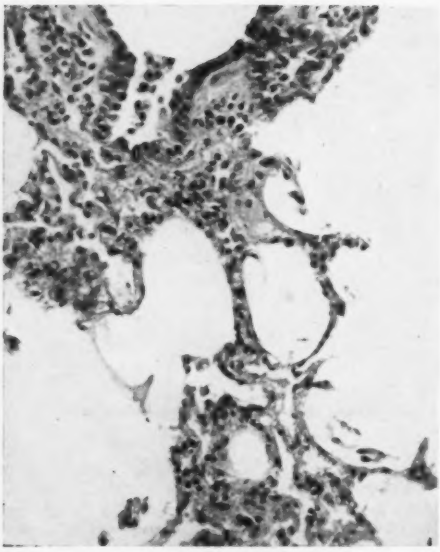

Fig. 5—Early stage with emphysematous alveoli adjacent to a bronchiole. Thin interalveolar septums and bullae have been formed by rupture. x 135.

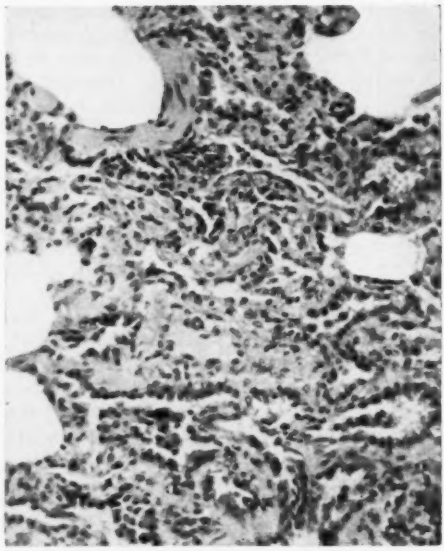

Fig. 6—Chronic stage characterized by interstitial fibrosis and partial collapse of epithelial-lined alveoli. A number of emphysematous alveoli remain. x 135.

and pronounced alveolar epithelial cell proliferation. Alveolar fibrin deposits, often surrounded by epithelial cells, were common in the alveolar lumens. Eosinophils were plentiful in both alveoli and interstitial areas, and also within alveolar capillaries. Individual pulmonary lobules had alveoli with emphysema, edema, fibrin, and epithelial proliferation. The interstitial septums had emphysema, edema, eosinophils, mononuclear cells, and dilated lymphatics containing edema or air.

The tonsils had bacteria, neutrophils, and necrotic cellular debris within the crypts. Most lymph nodes had prominent lymphoid reaction centers, hyperemic areas, and sinusoidal macrophages with hemosiderin. A bronchial lymph node had eosinophils and extensive emphysema, particularly in the subcapsular areas. Sometimes there were hemorrhage and thrombosis within emphysematous spaces and, in several areas, giant cells of Langhan's type were found around empty emphysematous spaces.

Cow 6.—This adult Hereford cow had fewer clinical signs than most in the herd.

Gross Pathologic Findings.—It was killed by gunshot, exsanguinated, and necropsied immediately. The nutritional state was fair. Three, large, thick-walled abscesses, up to 6 cm. in diameter, were found adjacent to enlarged bile ducts in the liver.

The tracheobronchial tracts were normal. The mediastinum was filled with air and extended into the left pleural sac where the lung was partially collapsed. Gas blebs were overlying the pericardium and were around the trachea and esophagus as far forward as the pharynx. The lung interstices were dilated by air; the parenchyma was pink or red and semisolid. The pericardial sac contained 5 ml. of thin, watery fluid.

Histopathologic Findings.—The liver had mild centrilobular lipidosis and several well-developed abscesses.

The lungs had large amounts of alveolar edema and fibrin and considerable interstitial emphysema. Eosinophils, alveolar epithelial cell proliferation, and atelectasis were present. Clusters of plasma cells were found around some blood vessels. The cow had chronic lung changes consisting of interalveolar fibrosis, with alveoli in these regions almost completely epithelialized and partly collapsed (Fig. 6). Eosinophils

were in the interlobular septums. The bronchioles contained edematous fluid and a few neutrophils. Peribronchial lymph nodules were hyperplastic.

Laboratory Findings

Intradermal Allergen Tests.—In an attempt to determine if recovered cows had sensitizing antibodies to extracts of grasses, weeds, and shrubs from the two pastures where the disease occurred, intradermal tests were performed. Extracts* were prepared from meadow fescue, tall fescue, Compositae, quack grass, white sage, common sage, Kentucky blue grass, mustard, canary grass, and water weeds. In addition, extracts were prepared from the rumen contents of 2 cows that died of the disease. The extracts were injected intradermally in 0.1-ml. amounts into 4 cows that had recovered from pulmonary emphysema. Observations were made at ½, 1, 48, and 72 hours, but there were no specific reactions in the skin sites.

Hematology.—Blood counts were made on 14 cows, bone marrow counts on 2, and blood chemistry on 5. The blood and marrow findings were normal, but low serum bicarbonate levels (below 18 mEq./1) indicated metabolic acidosis in 4 cattle. The histamine level of the blood was under 0.5 *gamma*/milliliter, which was within the normal range.[14]

Virus Tests.—Lung tissues from 3 cows were combined and homogenized for inoculation into tissue cultures of bovine kidney cells. Half of the inoculum was treated with antibiotics; half was passed through a Seitz filter. Neither sample produced cytopathic effects in cutured cells after three passages.

Bacteriologic Findings.—Aerobic and anaerobic bacterial cultures were made from the lungs, liver, spleen, kidneys, mesenteric lymph nodes, and contents of the small and large intestines of 7 cattle. The same tissues, but not the intestinal contents, were cultured also for pleuropneumonia-like organisms (PPLO) and fungi.

Bacterial cultures of the intestinal tract revealed predominantly hemolytic and nonhemolytic coliform organisms that grew aerobically and anaerobically. Also present were moderate numbers of streptococci, *Clostridium sporogenes*, and *Cl. perfringens*.

No known pathogenic bacteria were isolated from any of the tissues cultured. Of some interest, however, was a medium-sized, motile, encapsulated, gram-variable rod in the lungs of all of the cattle, in the mesenteric nodes of 4 cattle, and in 17 of 77 intestinal samples. Despite considerable biochemical testing this organism was not identified. Neither PPLO nor pathogenic fungi were found.

Toxin Studies.—The contents of the small intestines of 13 cows were tested for pH, stained by Gram's method, and inoculated into mice. The pH ranged from 6.0 in eight samples to 6.8 in five. Gram-positive rods were found in the intestinal contents of 8 cattle. Only one sample was lethal for mice, producing death in less than 24 hours. This sample was further tested by mixing with *Cl. perfringens* antitoxin types A, B, C, D, and E and inoculated into mice, but the antitoxins did not protect the mice.

Discussion

Etiology.—The reported causes of pulmonary emphysema in cattle are (1) forced inspiration and expiration, (2) paroxysmal attacks of coughing, and (3) occlusion of passages, resulting in decreased outflow of air with increased inspiration. It is not known that inadequate blood supply from vascular lesions is an important cause of emphysema in cattle.

The cause of the type of emphysema reported in this paper is purely speculative. There was no clinical indication that forced respiration or coughing preceded emphysema, and no pathologic evidence that the respiratory passages were occluded. Histopathologic study did not reveal degeneration of alveolar walls, elastic fibers, reticular fibers, endothelial cells, or epithelial cells that might precede alveolar dilatation. Neither arterial disease nor capillary degeneration was of primary significance, although capillary constriction with ischemia followed alveolar expansion and destruction.

Allergy is suggested by the clinical pattern of the disease: occurrence in older animals, definite latent period after change of feed, seasonal occurrence, and pathologic

*The extracts were supplied by the Hollister-Stier Laboratories, Oakland, Calif.

changes such as large numbers of eosinophils and acute vascular reaction in the lungs. If this were an allergic disease, it would probably develop as follows: Cows could be sensitized after ingestion or inhalation of plant proteins from the meadow, with development of allergic emphysema either after a short latent period or in a subsequent year after reintroduction to the pasture and resensitization. Convalescent cattle made allergic in this manner should react to the specific plant allergen when injected intradermally. Such was not the case, however, with the extracts used in this study, indicating either that the proper allergen was not included in the tests or that the bovine species does not react as other species do to intradermal injections of plant allergens. It is also possible that the extracts were prepared from the plants at the wrong time of the year.

It is possible that the cows ingest the allergic substances while on dry range and that the change of feed when they are brought on to lush meadow grass produces a change in the digestive tract, allowing absorption of the allergens into the blood stream.

The other main consideration, as far as cause is concerned, is that bacterial toxins, such as toxins of *Cl. perfringens*, might be formed at a more rapid rate and absorbed after a change of feed as occurs in enterotoxemia of sheep. There was no evidence in this study that toxins were present in the abomasums or upper digestive tracts of affected cattle. The intestinal fluids sometimes killed mice, but specific antitoxins failed to protect the mice.

Pathogenesis.—The first histologic change observed in the lungs of affected cattle was dilatation of alveoli with thinning of alveolar walls, then rupture producing large, multilocular spaces. Following this, and possibly co-existing with it, was a vascular reaction with hyperemia and leakage of edematous fluid into the alveoli. This was often accompanied by deposition of fibrin, and, at the same time or possibly later, alveolar epithelial cells prolifierated and formed continuous linings in the alveoli. It could not be determined whether the vascular and epithelial changes were primary or secondary to emphysema, but it is likely that the epithelial cell proliferation represented an attempt at regeneration of ruptured alveoli.

Interstitial emphysema developed early and followed rupture of emphysematous alveoli into interlobular spaces. Often this change was accompanied by edema, and sometimes by hemorrhage. Interstitial lymphatics often contained air, and this presumably accounted for the emphysema seen in the bronchial lymph nodes. Eosinophils usually accompanied alveolar and interstitial emphysema and were found throughout the involved lung. They were particularly numerous in interlobular septums. Eosinophils were common also in the bronchial lymph nodes. The presence of eosinophils in these locations can be interpreted on the basis of local hypersensitivity reaction.

Summary

An epizootic of acute pulmonary emphysema occurred among California range cattle in October. Morbidity was as high as 10% and mortality 5%. Onset of disease was sudden, and in some cattle it terminated fatally in as little as two days. Adult cattle were primarily involved. Although a specific allergen was not determined, the nature of the disease suggested that allergy was involved.

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Survey of Brucellosis in Michigan Wildlife

RECENT INVESTIGATIONS of brucellosis in Michigan white-tailed deer prompted Game Division Laboratory personnel to make a limited search for the disease in other wild species. Also, sporadic occurrences of brucellosis in cattle in areas where the disease was supposedly eradicated prompted livestock workers to speculate as to the possibility of wild species acting as reservoirs of brucellosis.

Trapping programs at the Rose Lake Wildlife Experiment Station in the spring and summer of 1959 and 1960 supplied most of the serum samples tested; other samples were taken from birds and mammals brought into the Game Division Laboratory from various areas in the Lower Peninsula.

TABLE 1—Wild Birds and Mammals Tested for Brucellosis

Species	Adult		Juvenile		Un-	
	Female	Male	Female	Male	known	Total
Cottontail rabbit (Sylvilagus floridanus)	15	18	56	80	3	172
Fox squirrel (Sciurus niger)	10	26	17	13	....	66
Raccoon (Procyon lotor)	2	9	15	25	3	54
Muskrat (Ondatra zibethica)	8	5	10	8	11	42
Opossum (Didelphis virginiana)	....	2	5	6	....	13
Skunk (Mephitus mephitus)	2	5	4	2	....	13
Woodchuck (Marmota monax)	....	....	3	....	1	4
Red squirrel (Tamiasciurus hudsonicus)	2	1	....	1	....	4
Mink (Mustela vison)	....	1	1	1	....	3
Elk (Cervus canadensis)	....	....	....	1	....	1
Beaver (Castor canadensis)	....	1	....	....	....	1
Chipmunk (Tamias striatus)	....	....	1	....	....	1
Long-tail weasel (Mustela frenata)	....	....	....	....	1	1
Pheasant (Phasianus colchicus)	....	2	....	33	....	35
Canada goose (Branta canadensis)	....	....	....	....	1	1
Great blue heron (Ardea herodias)	....	....	....	....	1	1
Ducks						
Mallard (Anas platyrhynchos)	1	1	6	2	....	10
Ring-necked duck (Aythya collaris)	....	....	....	3	....	3
Black duck (Anas rubripes)	....	....	1	1	....	2
Blue-winged teal (Anas discors)	....	....	....	1	....	1
Baldpate (Mareca americana)	....	....	....	1	....	1
Wood duck (Aix sponsa)	1	4	....	....	....	5
Lesser scaup (Aythya affinis)	....	....	1	....	....	1
Total						435

The standard *Brucella* plate-agglutination test was used to test the samples; the antigen was prepared by the USDA from *Brucella abortus* strain 1119-3. The samples were tested at dilutions of 1:25, 1:50, 1:100, and 1:200.

Serum from 435 wild birds and mammals representing 23 species was tested (Table 1); in none of the serum was there a positive reaction or agglutination in any dilutions.—*W. G. Youatt, B.S., and L. D. Fay, D.V.M., M.S., Michigan Department of Conservation, Game Division Laboratory, Rose Lake Wildlife Experiment Station, East Lansing.*

Effect of Three Shipping Fever Bacterins on *Brucella* Titers in Cattle

N. B. King, D.V.M., Ph.D.

CATTLE in herds presumed free of brucellosis occasionally have been reported as developing "suspect" or "reactor" titers for brucellosis after being given injections of certain biological products. The inconclusive nature of available information on this subject leads to a re-examination of the validity of these reports. Since shipping fever bacterins are commonly administered to cattle prior to interstate or international shipment, three of these were studied. Results of these studies are reported here.

The possibility of interaction between *Brucella* and *Pasteurella* organisms has been studied by numerous investigators. One investigator[8] reported that *Brucella*-immune serums agglutinated *Pasteurella* antigens and *Pasteurella*-immune serums agglutinated *Brucella* antigens. Another[2] reported that serum from cattle with hemorrhagic septicemia (shipping fever) agglutinated *Brucella abortus* up to a 1:150 dilution, whereas such serum did not agglutinate any of the *Pasteurella* above 1:140. Others[11,12] demonstrated cross-agglutination between groups of *Brucella* and *Pasteurella*; nevertheless, the injection of commercial shipping fever biological products did not result in the production of agglutinins demonstrable with *Brucella* antigens. Little or no serologic relationship was found between *Vibrio fetus* and *Brucella spp.*, although cross-agglutination occurred in low titer.[7] Later work[5,10] indicated that there was no apparent cross-agglutination between *V. fetus* and *Br. abortus*. One investigator[4] seemingly increased the *Brucella* titers of a high percentage of cattle by the injection of a mixed bacterin containing plasteurellae. Another[1] reported that some commercial bacterins, prepared from *Pasteurella multocida*, serotypes C and D, stimulated an increase in *Brucella* titer in strain 19-vaccinated cattle. Subsequent attempts to reproduce this phenomenan failed.[3]

From the Department of Veterinary Science, Ohio Agricultural Experiment Station, Wooster, in cooperation with the Animal Disease Eradication Division, ARS, USDA.

The author thanks Dr. C. R. Weaver, statistician, Ohio Agricultural Experiment Station, for his assistance, and Mrs. K. E. Close, Animal Disease Eradication Division, ARS, USDA, for her technical assistance.

Materials and Methods

Serologic Tests.—The standard tube agglutination method was used throughout the experiment. Serum in twofold dilutions, 1:25, 1:50, 1:100, and 1:200, and a standardized ARS, USDA, antigen were used. The tests were read following incubation at 37 C. for 48 hours. The maximal end titer was assigned to the highest dilution giving a complete reaction or to the next higher dilution provided an incomplete agglutination appeared.[6] For the purpose of statistical analyses the titers were coded as follows: no agglutination = 0, trace agglutination = 1, one half agglutination = 2, three quarters agglutination = 3, complete agglutination = 4. Each animal was tested at four levels, 1:25, 1:50, 1:100 and 1:200, so that the highest possible score was 16. Two evaluations of titers were made prior to administration of a bacterin. Eight evaluations were made at weekly intervals, subsequent to the administration of bacterins. The difference between the initial average titer (before administration of bacterin) and subsequent titers (after administration) was the variable analyzed. For example, the average of the first two tests might have been 4.5, the average of the last eight tests might have been 6.0. The animal's response in titer would then have been 1.5.

Animals.—A total of 120 cattle ranging in age from 10 months to 7 years were used in this test. Two thirds (80) had been calfhood vaccinated with strain 19 vaccine and the remaining one third (40) were unvaccinated. These cattle constituted a large part of a brucellosis-free dairy herd. In order to assess the brucellosis status, all cattle in the herd (approximately 180) were given a blood test at six-month intervals and a *Brucella* ring test at two-week intervals. During the four-month interval between the first and last tests, the cattle were main-

TABLE 1—Plan of the Experiment

Group	No. of cattle	Treatment	Re-treatment	Strain 19 vaccination history
Controls	30	None	None	10 unvaccinated
				20 vaccinated
A	30	30	15	10 unvaccinated
		Bacterin A	Bacterin A	20 vaccinated
B	30	30	15	10 unvaccinated
		Bacterin B	Bacterin B	20 vaccinated
C	30	30	15	10 unvaccinated
		Bacterin C	Bacterin C	20 vacinnated
Totals	120	90	45	.....

tained in pasture or winter quarters as a single herd under conditions intended to avoid opportunity for *Brucella* exposure.

The cattle were allotted to four groups for the purpose of the experiment (Table 1). Cattle in group A (20 vaccinated with strain 19 vaccine and 10 unvaccinated) were given 5 ml. of bacterin A by injection. Five days later, one half (10) of the vaccinated cattle and one half (5) of the unvaccinated ones again were given injections of 5 ml. of bacterin A. Cattle in groups B and C were given injections in the same manner as cattle in group A, using bacterins B and C. The control cattle (20 vaccinated with strain 19 vaccine and 10 unvaccinated) were not given bacterin.

The Bacterins

All bacterins were administered subcutaneously in the amounts and by methods customarily used in veterinary practice. The three bacterins employed in this study are described as follows:

Bacterin A.—This product, identified as "hemorrhagic septicemia bacterin," consisted of chemically killed, whole broth suspension of *Pasteurella* organisms isolated from cattle (12.5%), buffalo (12.5%), swine (25.0%), sheep (25.0%), and horses (25.0%).

TABLE 2—Mean *Brucella* Blood Agglutination Titer Response of Bacterin-Treated and Control Cattle

Treatment	Mean response*
Bacterin A	0.97
Bacterin A (2 injections)	0.48
Bacterin B	1.17
Bacterin B (2 injections)	0.69
Bacterin C	0.42
Bacterin C (2 injections)	0.64
All bacterin-treated cattle	0.73
Controls	0.29

*Response code for each dilution: no agglutinations = 0, trace agglutination = 1, one half agglutination = 2, three quarters agglutination = 3, and complete agglutination = 4.

Bacterin B.—Bacterin B, identified as "hemorrhagic septicemia bacterin," consisted of chemically killed, saline suspension of *Pasteurella bubaliseptica* (50.0%), *Past. boviseptica* (12.5%), *Past. suiseptica* (12.5%), *Past. equiseptica* (12.5%), and *Past. oviseptica* (12.5%).

Bacterin C.—This was identified as "hemorrhagic septicemia bacterin," and the formula for it was chemically killed culture of *Pasteurella multocida*—type 1 (25%), type 2 (50%), and type 3 (25%).

Results

The differences between the initial mean titer and subsequent titer (response) were analyzed by the analysis of variance.

There were no differences between responses in titers for vaccinated and unvaccinated cattle. The titers were different, but responses were not. The mean response for the control and bacterin-treated cattle is given (Table 2).

The greatest mean response (1.17) occurred in titers of cattle given one injection of bacterin B. The least response was found in the controls (0.29). The mean response for all cattle given bacterins was 0.73 and 0.29 for the controls. The mean difference between the cattle given bacterins and the controls was 0.44 or approximately one eighth of one dilution. This difference was not statistically significant.

The amount of individual animal titer response and change in classification are summarized (Table 3).

Discussion

Whether the cattle had been calfhood vaccinated with strain 19 vaccine seemed to have no influence on the response. A second injection of the bacterins had little or no effect on the response.

Whether there were differences in response between the cattle given bacterin and the control cattle depended on the criterion used in measuring the response.

When the response was defined in terms of mean titers, all cattle given bacterin had a rise in titer over the controls (Table 2). If the response was defined as a full dilution rise, the data again indicated that the bacterins increased the response (Table 3). However, in both instances, the increases were not statistically significant at 0.05 probability level.

When the response was defined as a

TABLE 3—Titer Response and Change in Classification After Injections of Bacterins

Bacterin treatment	Strain 19 vaccination history	Changed from neg. to susp.		Titer rise of at least one dilution	
		No. cattle	%	No. cattle	%
Controls	Unvaccinated	1/10*	10	0/10**	.....
	Vaccinated	1/20	5	0/20	.....
Bacterin A	Unvaccinated	1/9	12	1/9	12
	Vaccinated	2/20	10	2/20	10
Bacterin B	Unvaccinated	1/9	12	1/9	12
	Vaccinated	1/19	5.3	4/19	21
Bacterin C	Unvaccinated	1/9	12	1/9	12
	Vaccinated	0/20	.....	2/19	10.5

*Numerator = number of animals changing from negative to suspicious classification; denominator = total number in group.
**Numerator = number of animals having one dilution titer response; denominator = total number in group.

change from negative to "suspect" classification, the bacterin treatments seemed to have had little or no effect.

The responses, whether defined as change in classification or as specific amount of titer rise, were of a transitory nature. Approximately 75% of the changes in classification appeared only once during eight subsequent tests. Three cattle responded in this manner for at least three of the eight subsequent tests.

Summary

A total of 120 dairy cattle were used to study the influence of three shipping fever bacterins on *Brucella abortus* agglutinin titers.

When the response was defined in terms of a rise in mean titers or as a full dilution titer rise, the data indicated that the bacterins increased the response. However, the increases were not statistically significant.

When the response was defined as change in classification from negative to "suspect," the bacterin treatments had little or no effect.

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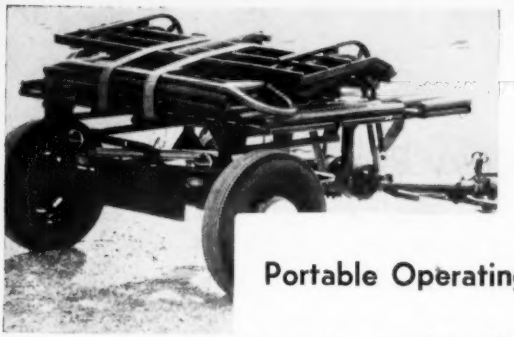

Fig. 1—The compactly folded operating table can be towed conveniently as a trailer behind a car and may be equipped with all necessary attachments for common traffic conditions.

Portable Operating Table for Large Animal Practice

A number of portable operating tables developed at the Richard-Götze Institutes in Hannover, Germany, have been in use since 1955. Because of their unusual compactness and apparent practicability, details of application are reported here. The equipment is described as being useful for experimental, diagnostic, therapeutic, surgical, and obstetric purposes.

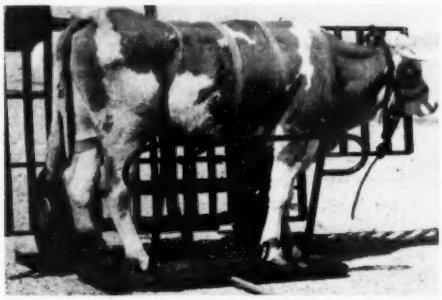

Fig. 2—With the wheels held in position with chocks, the table is tipped upright so that the surface on which the animal will lie is vertical. The foot plate, fastened to the middle of the table, lies flat on the ground, and a railing is inserted into it. The headpiece and other extensions are attached. The bovine patient, blindfolded, is led onto the foot plate and tied tightly with a halter to the headpiece of the table. Then three belts are placed around the patient and tightened simultaneously and rapidly to prevent lying down. The caudal belt is passed under the outer leg and over the leg lying against the table.

Fig. 3—Three men are needed for tipping the table into operating position.

Fig. 4—The foot plate and tilting lever are removed. The cow's legs are tied. When the patient is to be placed upright again, the belts tying the hoofs are taken off first, the foot plate is put back on the table, and the head is loosened to permit the patient to be led away immediately. Adjustable auxiliary supports are used to improve stability of the table and provide additional support for heavy animals. The table is not recommended for cattle weighing more than 2,000 lb. Pads are placed under the shoulder region to minimize chances of producing radial paralysis.

Fig. 5—When necessary, the table can be tipped on end and rolled through narrow entrance-ways on a small auxiliary wheel.

Abstracted from a report by Karl Diemhofer entitled "Eignung des fahrbaren Operationstisches der Götze-Institute Hannover für Klinik und Praxis, (Suitability of the Portable Operating Table of the Götze Institutes in Hannover for the Clinic and Practice.) *Wien, tierärztl. Monatsschr.*, 47, (1960): 779.

Photographs were supplied through the courtesy of the publisher, Urban & Schwarzenberg, Vienna, Austria.

The Dollars and Sense of Dairy Practice

William S. Griffith, M.S.

THE VETERINARY practitioner of today is working with a changing dairy industry. He deals with larger herds than were usually found just a few years ago. For example, the average Virginia grade A herd now has 40 cows, the average DHIA herd has 49 cows, and the number of herds with 100 or more cows is steadily increasing.

He is dealing with dairy cows of a different nature than those of just a few years ago. Today's cows produce more and are more valuable as individuals.

He is dealing with more intelligent, educated dairymen with large capital investments estimated on an average at $1,500 to $1,800 per milk cow. He is dealing with dairymen who think of veterinarians more and more in terms of partners in maintaining dairy herd health and productivity. Such views require that veterinarians increasingly emphasize their role as educators and minimize their role as dispensers of animal medicaments. It may be that the logical outcome of such thinking will be contractual agreements between dairymen and veterinarians.

To be of greatest help to dairymen, veterinarians must be aware of certain basic facts concerning dairymen's operations. One of the first prerequisites to profitable dairying is a herd of cows each of which calves regularly at approximately 12-month intervals. Cows that do not calve with this frequency are fertility problems that cost the dairyman, in the opinion of some authorities, as much economically as does mastitis. Failure of a cow to conceive on the first service costs the dairyman approximately a dollar per day on a grade A cow. Although many progressive dairymen already have adopted the practice of having routine pregnancy diagnoses made, few have recognized the value of routine postpartum and prebreeding genital examinations to determine which cows are ready to be bred and which cows require further medical attention. Dairymen admit their lack of knowledge about reproductive problems and are receptive to educational programs concerning this subject. Veterinarians on their farm calls should take advantage of opportunities to explain why a herd health program directed at eliminating reproductive problems should be adopted.

A second prerequisite to profitable dairying is a herd of cows that produces as much milk as each cow's inherited potential will permit. The first factor limiting production by genetically superior dairy cows is insufficient feed. One reason why such a situation exists is inadequate records. For example, only 38% of the "grade A" dairymen and less than 1% of the manufacturing milk producers in Virginia are enrolled in any production testing program. If they are not enrolled in a sound program requiring record keeping, they probably do not know how much each individual cow produces or how much grain each cow needs to supplement her forage. It would seem that for efficient, profitable dairying today participation in the Owner-Sampler or DHIA machine-processed programs are necessary.

A second factor limiting production is the belief that grain feeding is injurious to cows and unwise economically if more than 16lb. of grain per cow per day is fed regardless of production per cow. Some dairymen consider this type of feeding an expense that makes high production unprofitable. Correcting such erroneous beliefs is a responsibility for all who are engaged in educating dairymen, including veterinarians. In regard to grain feeding, a specific responsibility of veterinarians is to re-educate those dairymen who believe that grain feeding causes mastitis.

Other factors limiting production involve introduction of diseases. Veterinarians should impress upon dairymen the necessity of isolating new additions to a herd.

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Dairy farms almost universally lack facilities for isolating purchased replacements.

What differences in productivity can mean economically to a dairyman can be shown by the following: In a study made in Virginia in 1958, DHIA herds averaging 6,900 lb. of 4% milk per cow per year, yielding $93 per cow per year to pay for labor and compensate management. Assuming a labor cost of $1 per hour and a labor requirement of 100 hours per cow per year, management suffered a $7 per cow annual loss. In contrast, herds that averaged 12,212 lb. of 4% milk returned $307 per cow per year to pay for labor and compensate management. With 100 hours of labor required at $1 per hour, management realized a yield of $207 per cow per year.

Whether herd health is adequate can be measured readily by determining the amount of production per cow and the amount of production per man. In Virginia, for example, it requires 8,000 lb. of milk per cow per year and 200,000 lb. of milk per man per year for economic survival. Since the "break-even" level is rising continuously, one may reasonably anticipate that milk production per man will rise to 400,000 lb. per year.

Dairying is undergoing a metamorphosis from a way of life to a business. It is a change that many dairymen will find painful and a change that veterinarians as well as others who work with dairymen will have to accept. Such a change will require increased emphasis on animal health education by veterinarians and decreased emphasis on treatment of cows for injuries or disease.

Salmonellosis, in Parakeets, Transmissible to Man

A pet parakeet reportedly was the source of *Salmonella* infection in a human infant 7 months old. The parakeet shed large numbers of *Salmonella typhimurium* in its feces, and the infant frequently played under the cage in an area where feces fell.

The incidence of salmonellosis among parakeets is unknown. However, in a study of 25,000 parakeets raised in California and eastern aviaries from 1932 to 1939, *Salmonella* could not be isolated. In another investigation, 37% of the parakeets from a single dealer were infected with *S. typhimurium* as determined by culture at necropsy. Infection was believed to have been acquired by association with large South American psittacine birds.

There are about 15,000,000 parakeets in American homes today, and these birds are often kept in or near the kitchen.—*New England J. Med., 264, (April 27, 1961): 868.*

Clinical Evaluation of Surgical Removal of Adult Heartworms (*Dirofilaria immitis*) from Dogs

I. M. Gary Gourley, D.V.M.

HEARTWORM (*Dirofilaria immitis*) infection as a problem in native Minnesota dogs was first recognized in 1955.[6] In general, our experience with chemotherapeutic agents for the treatment of this disease has been disappointing. Because of this, a method of pulmonary arteriotomy was investigated in the spring and early summer of 1958 and found to be safe and fairly effective for the removal of adult heartworms.

Reports[2,5,8] have been made on techniques of pulmonary arteriotomy for the removal of adult heartworms, but a clinical evaluation of such a procedure has not been presented to date. This report is made to record experiences with surgery for the treatment of heartworm infection.

Materials and Methods

The case histories of 8 canine heartworm patients presented for surgical treatment at the University of Minnesota Veterinary Clinic are reported.

The method of operation, unless otherwise stated in the case protocol, was as follows:

Food was withheld from the dog for 12 hours, and 1/150 gr. of atropine sulfate per 15 lb. of body weight was administered one hour before surgery. Anesthesia was accomplished with pentobarbital sodium given intravenously; oxygen was administered with a positive pressure resuscitator at the rate of 10 to 14 respirations per minute.

A skin incision was made over the left fifth intercostal space down to the latissimus dorsi muscle. This muscle was not incised but bluntly freed and lifted dorsally. The incision was extended through the fifth intercostal space and a Finochietto rib retractor (Fig. 1d) placed into the opening. The wound was opened with the ratchet so that the hand could be inserted into the thoracic cavity. The azygous vein was located and ligated with 00 medium chromic catgut.

In the dog under normal conditions, the blood flow through the azygous vein is low.[1] When total caval occlusion occurs, however, the rate of flow increases to 8 to 14 cc. per kilogram of body weight per minute. Thus, to reduce blood loss and clear the operative field, this vessel was ligated.

After ligation of the azygous vein, the anterior and the posterior vena cavae were dissected free and a 12-inch length of ⅛-inch braided suturing tape passed around each vessel. Both ends of each suturing tape were passed through a 4 cm. length of 3/16-inch by 1/16-inch intravenous surgical tubing, and a Kelly hemostatic forceps was placed over the tape ends on the side of the tube away from the vessel.

An incision of 5 to 6 cm. was made in the pericardial sac 1.0 to 1.5 cm. ventral and parallel to the phrenic nerve. The pericardial sac was pulled through the wound opening and sutured to the latissimus dorsi muscle dorsally and to the deep pectoral muscle ventrally. Two stay sutures of 4-0 black braided silk were placed in the trunk of the pulmonary artery 2.0 to 2.5 cm. above where the artery leaves the heart. The sutures were about 1.0 cm. apart on either side of the anticipated incision into the artery.

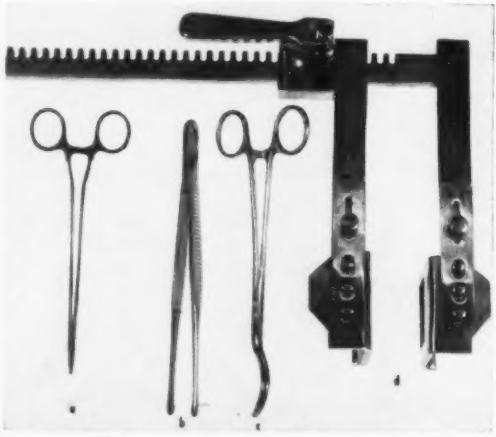

Fig. 1—Special surgical instruments used for the described method of pulmonary arteriotomy are: a—Sklar cardiovascular needle holder; b—Russian tissue forceps; c—Kapp-Beck spoon-type coarctation clamp; and d—Finochietto rib retractor.

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Caval occlusion was accomplished by forcing the rubber tubings down the suturing tapes with the Kelly forceps until resistance was encountered. The forceps then were clamped shut. After a waiting period of 10 to 15 seconds (to allow the heart to empty), an incision 1.5 to 2.5 cm. was made into the pulmonary artery between the stay sutures, which were held taut by Kelly forceps. The pulmonary artery and right ventricle then were explored for heartworms with a Russian tissue forceps (Fig. 1 b). Two and one-half minutes were allowed for this portion of the procedure. When necessary, the vessel was re-entered after systemic recirculation of blood from the anterior vena cava using a Kapp-Beck spoon-type coarctation clamp (Fig. 1 c) placed over the arterial incision outside of the stay sutures.

To effect closure of the pulmonary artery, the coarctation clamp was placed over the incision as previously described. The anterior vena cava was released, and the blood from this vessel was allowed to enter the heart. One minute later the posterior vena cava was released, the stay sutures removed, and the incision in the artery closed with a continuous row of 6-0, type B, black braided silk sutures using double taper point atraloc C_1 needles and Sklar cardiovascular needle holder (Fig. 1 a). The coarctation clamp was released and the suturing tapes removed from around the anterior and posterior venae cavae. Interrupted 4-0 black braided silk sutures were used to close the pericardial sac; the thoracic cavity was dried and closed. Negative pressure was re-established by inserting into the thoracic cavity a needle which was attached to a syringe by means of a three-way valve. Postoperative care consisted of administering antibiotics, supportive therapy as indicated, and good nutrition.

Case Reports

Dog 1.—On June 12, 1958, a 60-lb., male Collie, 6 years old, was presented for heartworm examination. There was no history of previous therapy. The dog appeared to be in good health, except that it tired slightly during exercise. A saponin-citrate test was positive for microfilariae.

The dog was returned Aug. 3, 1958, for surgical treatment and appeared in good clinical health. A pulmonary arteriotomy was performed Aug. 5, 1958, without surgical complications. Adult heartworms were not found, nor were gross pathologic changes observed in the thoracic viscera. On the first postoperative day, the dog did not eat, was weak, and was lame in the left foreleg. The second day it was stronger, began eating, and the lameness was less severe. Further recovery was uncomplicated, and the dog was discharged Aug. 12, 1958.

Sutures were removed Aug. 22, 1958. A saponin-citrate test on this date was positive for microfilariae.

Subsequently, the dog led a normal life until August, 1960, when it became ill and was taken to a local veterinary hospital. It died in that hospital of pneumonia, diagnosed at necropsy. A saponin-citrate test again was positive, but no adult parasites were found. The pneumonia was not thought to be a complication of surgery.

Dog 2.—On April 7, 1959, a 20-lb., male Terrier, 6 years old, was presented for examination because it tired easily and had a severe cough. The general physical condition of the patient was good and no abnormalities in the circulatory system were apparent. A saponin-citrate test was positive for microfilariae.

A pulmonary arteriotomy was performed April 9, 1959. When anesthesia was induced, a total dose of 7 gr. of pentobarbital sodium was given to abolish pain reflex signs. Respirations were slow and shallow. Because the dog was to be maintained on a resuscitator, concern was not held for this factor. During surgery, heart action was slow but strong. After incision into the pulmonary artery, 100 adult heartworms were removed, and suturing was begun. At this point, heart action became weak, and cardiac arrest followed. There was no response to epinephrine, and the thorax was closed.

Necropsy of the dog revealed no further adult heartworms in the right ventricle or pulmonary vessels.

Dog 3.—On March 16, 1959, a 65-lb., male German Shorthaired Pointer, 6 years old, was examined for heartworms. In 1957, the dog had been treated elsewhere with arsenicals for heartworm infection. A saponin-citrate test 6 months after this treatment had been negative.

On physical examination, there were no signs of circulatory trouble, but a saponin-citrate test was positive for microfilariae. Therapy was not recommended and the dog was discharged.

One year later, March 21, 1960, the dog was given a general examination. There were no observable signs of disease, but a saponin-citrate test still was positive, and thoracic radiographs revealed cardiac enlargement, pulmonary congestion, and increased pulmonary density suggestive of vascular obstruction by heartworms. It

was decided that treatment was not indicated and the dog was discharged.

Six weeks later, May 2, 1960, the dog was readmitted, with obvious signs of congestive right heart failure. Ascites, dyspnea, vomiting, and coughing had developed. The dog was hospitalized and prepared for surgery.

Surgery was performed May 4, 1960. The thoracic cavity was opened, and approximately 250 cc. of straw-colored fluid was removed. Numerous adhesions were encountered in and around the mediastinum and pericardium. As the mediastinal adhesions were broken, extensive hemorrhage occurred. The hemorrhage was controlled, but it was evident that adequate exposure of the veins could not be made. The pericardial sac was opened and two stay sutures placed in the pulmonary artery (the trunk of the pulmonary artery was 6 cm. in diameter and about 3 cm. in each branch). The two ends of the one stay suture were passed between the two ends of the opposite stay suture, and Kelly forceps were placed on the ends of the two different sutures. An incision was made between the stay sutures; the hemorrhage was controlled by exerting tension on the sutures. By blindly probing through the incision, 60 adult heartworms were removed. There was extensive blood loss, and a transfusion of 500 cc. of whole blood was given intravenously. The remaining surgery was uncomplicated and the animal was returned to the recovery ward where it made a slow and uncomplicated recovery from anesthesia.

During the first two postoperative days, the dog refused food, and was weak and depressed. On the third postoperative day it began to eat, was much more alert, stronger, and the ascites had disappeared. Further progress was satisfactory, and the dog was discharged May 11, 1960.

Sutures were removed May 20, 1960, and it was observed that fluid again was accumulating in the abdominal cavity; otherwise, the dog appeared to be in good health and was eating well. Digitalis and diuretic treatments were begun.

When the dog was last examined June 10, 1960, it had signs of advanced congestive right heart failure. As the owner was returning home from the clinic, the dog suddenly died in the back seat of the car and subsequently was buried before a necropsy could be made.

Dog 4.—On May 19, 1960, a 46-lb., male Chesapeake Bay Retriever, 9 years old, was presented for heartworm treatment. The dog had been losing weight for five or six weeks; its appetite was poor; and it had developed a deep cough. On the day prior to examination, the dog had collapsed after mild exercise.

On examination, the dog was depressed and poorly nourished; there was a systolic murmur audible over the heart on both sides of the thorax. Both eyes had senile cataracts.

Significant laboratory findings were: a positive saponin-citrate test, a high concentration of albumin in the urine with granular casts in the sediment, a blood hemoglobin concentration of 9.7 Gm./100 ml., neutrophilia (without a left shift), and eosinophilia. On radiographic examination, there was enlargement of the pulmonary vessels with congestion of the hilar region and dorsal lobes of the lungs.

Surgical treatment was recommended, and a pulmonary arteriotomy was performed May 20, 1960. Ten adult heartworms were removed individually from a dilated pulmonary artery and 5 more from the right ventricle. As closure of the thorax was begun, there were signs of pain, and ether was administered by means of the resuscitator. As soon as ether was administered, the dog became cyanotic, and heart action slowed, then stopped. Cardiac massage and stimulants were of no avail. Because it was known that the dog would be buried, making a necropsy impossible, an examination of the pulmonary artery and right ventricle was made. Fifteen adult heartworms were found in the right ventricle.

Dog 5.—On May 5, 1960, a 43-lb., female Irish Setter, 3 years old, was examined for heartworms. Clinically there were no observable signs of disease, but the owner complained that the animal lacked hunting stamina and did not eat normally. A saponin-citrate test was positive. On radiographic examination of the thorax, there were prominent pulmonary vessels, congestion of the lung fields, and compensatory emphysema.

The dog was returned to the clinic May 24, 1960, and a pulmonary arteriotomy was done May 26, 1960, with no complications. A total of 12 adult heartworms entwined into a clump were removed.

Postoperatively, the dog did well except

for lameness of the left foreleg which disappeared by discharge time, June 1, 1960. Subsequent to surgery, the dog's appetite improved, it hunted in the fall, and raised a litter of pups.

Dog 6.—On July 14, 1960, a 70-lb., male Irish Water Spaniel, 5 years old, was referred to the clinic for heartworm surgery. There were signs of right heart failure, marked ascites, dyspnea, cyanotic mucous membranes, emaciation, and depression. A systolic murmur was audible over the heart on both sides of the thorax and, although the pulse was strong, a thrill coincidental with cardiac systole was palpable.

Significant laboratory findings were a positive saponin-citrate test for microfilariae, neutrophilia (without a left shift), and eosinophilia. On examination of thoracic radiographs (Fig. 2 and 3), there was enlargement of the pulmonary vessels with congestion of the lung fields and compensatory emphysema.

Surgery was performed July 17, 1960. Upon entering the thorax, scattered adhesions were encountered, as was marked, uniform dilation of the pulmonary artery and its branches (approximately 5 to 6 cm. in diameter). On first entrance into the pulmonary artery, only 6 adult parasites were found. Further explorations, however, revealed 50 heartworms entwined in a mass at the bifurcation of the pulmonary artery. Since heart action was poor at this point, no additional explorations for parasites were made. Immediately following the operation, 250 cc. of whole blood was administered intravenously to minimize surgical shock.

Postoperatively the dog did poorly, having a fever and leukocytosis for five days. After the fifth day, the temperature was normal, and the white cell count began to return to normal. Respirations remained labored, but the ascites had disappeared. The dog's condition remained static and,

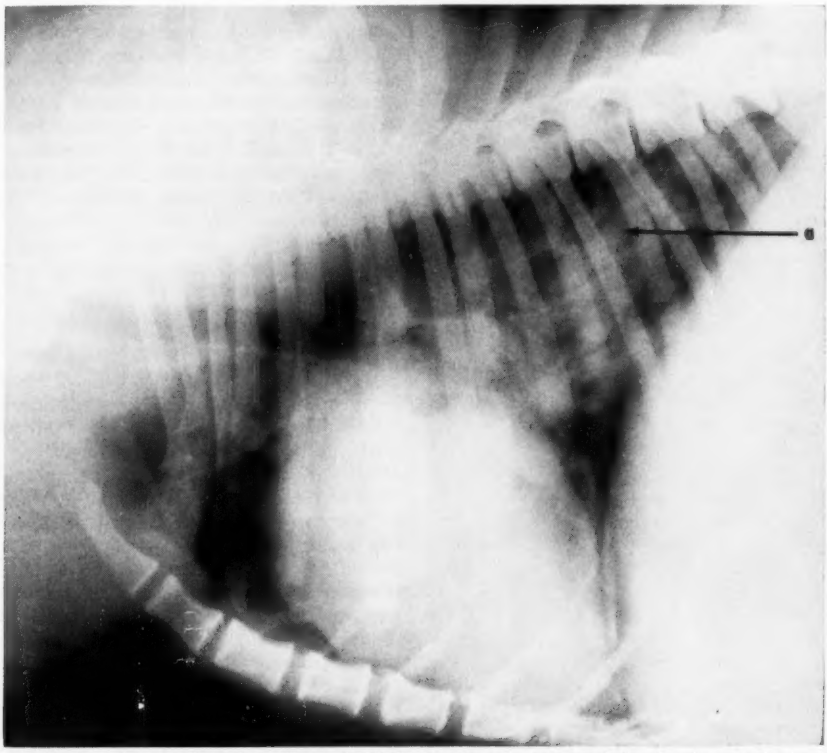

Fig. 2—In a lateral thoracic radiograph of dog 6, there is increased density (congestion) of the diaphragmatic lobes of the lungs (a).

on Aug. 2, 1960, sutures were removed, and it was discharged to the owner.

A report from the owner on Dec. 30, 1960, indicated that the dog had done poorly through the remainder of the summer, but with the advent of cooler weather, weight gain and general improvement were noticed. Improvement continued, and examination by the referring veterinarian in December, 1960, indicated that the dog had regained much of his former vigor.

Dog 7.—On May 2, 1960, a 50-lb., male Irish Setter, 4 years old, was examined for heartworm infection. When 2½ years old, this dog had been treated with arsenicals for heartworms. In 1959, it had been outstanding in American field trials but, since that time, had begun to tire in competition.

Upon examination, no signs of disease were manifest. A saponin-citrate test for microfilariae was positive. On radiographic examination of the thorax, there was compensatory emphysema of both lung fields with evidence of fibrosis around the hilus of the lungs. It was brought to the owner's attention that pulmonary emboli, which may result from arsenical treatment, could reduce the dog's endurance. He, therefore, requested surgery after the summer season, when heartworm infection is transmitted.

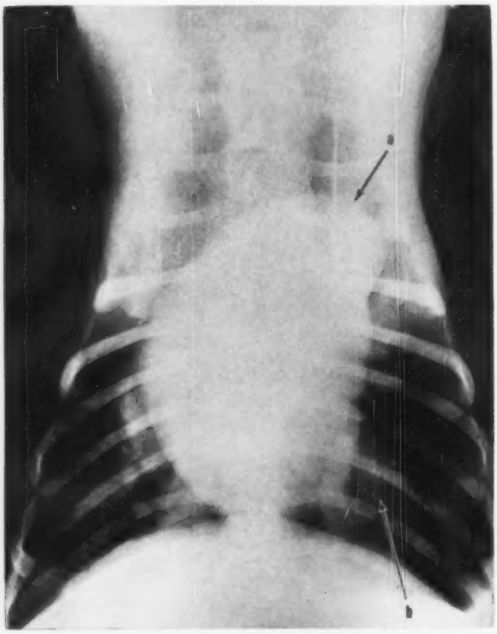

Fig. 3—In a ventral dorsal radiograph of dog 6, the enlarged pulmonary artery (a) and an enlarged branch of the pulmonary artery (b) are evident.

A pulmonary arteriotomy was performed Sept. 29, 1960. Fifteen entwined adult heartworms were removed. There were no surgical or postoperative complications, and the dog was discharged Oct. 4, 1960.

One month after surgery, preliminary field trial training was initiated. The owner stated that the dog had increased stamina and that he was entirely satisfied with the results of surgery.

Dog 8.—On Oct. 3, 1960, a 63-lb., champion male English Setter, 3½ years old, was presented for examination because of tiring when exercised and loss of libido. Radiographic examination of the pelvis and thorax revealed hip dysplasia, pulmonary congestion, and slight compensatory emphysema with no evidence of enlargement of the pulmonary vessels. A saponin-citrate test was positive for microfilariae, and eosinophilia was detected on examination of blood smears.

During pulmonary arteriotomy on Oct. 4, 1960, 8 adult heartworms were removed. No significant surgical or postoperative complications occurred, and the dog was discharged Oct. 17, 1960.

Since surgery, the dog has serviced females, and the owner states it is much more active and alert.

Discussion

Surgical treatment for heartworms has been developed because chemotherapeutic agents have caused undesirable effects or have not been sufficiently effective. The surgical technique is safe when employed by a veterinarian experienced in surgery. Efficiency of removal is in proportion to the concentration of heartworms. If the parasites are massed within the heart chambers, a 90% or better removal can be expected. If, however, they are individually dispersed throughout the right ventricle of the heart and the pulmonary artery, removal of all may not be possible. Consequently, the disadvantage of the operation is that neither the number nor the distribution of the parasites can be predetermined, making it difficult to select those

animals which may benefit most by surgery.

Once it has been established with certainty that an animal is infected with heartworms, a choice of treatment must be made. Under present circumstances, to determine dogs in which surgery is indicated, the veterinarian will have to depend upon his own experience and evaluation of the patient presented.

Factors which may be of aid in making this evaluation are:

1) *Environmental Conditions Affecting the Dog.*—(*a*) House pet as opposed to a working dog, *i.e.*, endurance of a house pet is not as essential as for a field dog; (*b*) economic or sentimental value of the patient.

2) *Severity of Signs.*—(*a*) Animals with definite signs, *i.e.*, coughing and tiring, but yet appearing to be in good physical condition, are more likely helped than are animals with obvious signs of right heart failure. Such animals also may be treated with arsenicals with success. (*b*) Even in relatively healthy animals, pulmonary emboli caused by disintegrated or dead adult heartworms resulting from medical treatment may give rise to thoracic problems. Such problems should not arise from surgery. (*c*) In all probability, dogs with right ventricular heart failure will not respond well to medical treatment but may respond to surgical treatment.

3) *Size of the Patient.*—Dogs weighing over 40 lb. are more easily operated upon than smaller ones.

4) *Age.*—In general, dogs under 8 or 9 years of age are better surgical risks.

5) *Radiographic Examination of the Thorax.*—Dogs with evidence of pulmonary congestion, compensatory emphysema, and enlargement of the pulmonary vessels probably will have a better chance to lead a normal life if treated surgically rather than medically.

6) *Humane Aspects.*—Chances for recovery from surgery are as good, if not better, in certain instances as from medical treatment. However, if death should occur, it is painful and lingering if caused by arsenicals, whereas it is rapid and usually painless if caused by surgery.

If heartworms are not found at the time of operation, a negative attitude should not be taken; the procedure has served as a diagnostic aid, enabling the veterinarian to ascertain that a heavy infection was not present. As a result, a favorable prognosis can be made with certainty. This is emphasized in the case of dog 1 since adult heartworms were not found at necropsy two years after surgery. This dog also brings to mind the following unanswered questions: (1) At one time in the life of this dog were there adult heartworms which produced microfilariae and subsequently died? (2) Were there adult heartworms overlooked at necropsy? (3) Did the microfilariae observed belong to *Dirofilaria immitis* or to the *Dipetalonema spp.?* The veterinarian should differentiate between *Dirofilaria* larvae and *Dipetalonema* larvae[3,4,7] so that unnecessary and hazardous treatment will not be given.

There was chronic inflammatory thoracic disease (adhesions) to a minor degree in dogs 3 and 6. The adhesions in the German Shorthaired Pointer (dog 4), however, were sufficiently extensive to prevent normal performance of the operative procedure. The adhesions in these 2 dogs probably resulted from healed pulmonary infarcts caused by heartworms. The previous arsenical treatment in dog 3 very likely caused numerous infarcts and accounted for the number of adhesions observed at the time of the operation.

The right ventricular heart failure in each of these dogs was due to mechanical obstruction of the pulmonary artery by the heartworms. Either the obstruction in the German Shorthaired Pointer was not sufficiently relieved or the extreme dilation of the pulmonary vessels did not allow for clinical recovery. Perhaps if this dog had been operated upon when first examined, a more satisfactory outcome could have been obtained.

The removal of the entwined parasites from the bifurcation of the pulmonary artery in the Irish Water Spaniel (dog 6) evidently alleviated the blockage, allowing this dog to eventually make a satisfactory recovery. Some heartworms undoubtedly were left but not in sufficient number to cause continued trouble. The slow recovery of this dog apparently was due to its debilitated condition before surgery, complicated by an operative infection.

The 3 Setters (dogs 5, 7, and 8) were in good physical condition, had relatively mild clinical signs, withstood surgery well, and made rapid recoveries. In view of the small number of parasites removed and the ap-

parent recoveries, it is difficult to explain their disease signs entirely on the basis of mechanical obstruction. This may be circumstantial evidence to support the theory of a toxic reaction by the dog to a metabolic product of the adult heartworm.

The deaths of dogs 2 and 4 were attributed to overdoses of anesthetic. Subsequent to these accidents, greater care has been taken not to exceed the calculated dose of pentobarbital sodium. If further anesthetic analgesia is required, meperidine hydrochloride* may be used at the dose of 2.5 mg. per pound of body weight.

Summary

Eight canine heartworm patients were admitted for surgical treatment at the University of Minnesota Veterinary Clinic and were subjected to pulmonary arteriotomy. Five dogs made satisfactory surgical and clinical recoveries as determined by observation periods of six months to two years. A modified surgical procedure was employed on 1 dog, and a satisfactory surgical recovery resulted; however, right ventricular heart failure persisted, and the dog died one month after surgery. The remaining 2 dogs subjected to pulmonary arteriotomy died from cardiac arrest during surgery, attributable to anesthetic overdoses.

*Demerol, Winthrop Laboratories, New York, N.Y.

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Primary Heart Tumors in Dogs

Two Alsatian dogs developed primary heart tumors (hemangioma cavernosum) in the wall of the right auricle of the heart. In both dogs, hemorrhage from the tumor into the pericardium caused cardiac tamponade and death.

In 1 dog, a 3-year-old, onset of clinical signs was followed quickly by death. He reared up on his hindlegs, fell backward, and lay dead. In the other, an 8-year-old bitch, there were signs of unrest clinically for eight hours and noticeable "pumping" respiration. Primary heart tumors are rare in dogs.—*Berl. Münch. tierärztl. Wchnschr., 74, (June, 1961): 217.*

Editorial

Intrathoracic Anesthesia

In 1955, it was reported[5] that only two failures occurred when thiamylal sodium solution was given intrathoracically to 100 cats by means of a 25-gauge, ½-inch needle. Anesthesia lasted from 15 to 45 minutes.

In an editorial report on practice tips offered at a state veterinary meeting,[3] two veterinarians were said to have recommended giving pentobarbital sodium intrathoracically to cats, but a third objected on grounds that the drug would probably be irritating and that intravenous administration should be preferred.

In an article published in Poland in 1960 (*see* abstract, *J.A.V.M.A.*, 138, (March, 1961): 301), it was reported that the intrapleural (intrapulmonic?) administration of a 10% barbiturate solution to dogs difficult to restrain was a satisfactory procedure. The resulting lung lesions were no larger than 2 by 12 mm. and after 10 to 12 days had healed with a small scar.

More recently, a German author,[4] advocating the use of 4% thiamylal sodium (1 cc./5 lb. body wt.) given intrathoracically to cats, commented that the procedure is more commonly used in the United States and England than elsewhere, although the procedure has been questioned in those two countries. He made the injections at the seventh intercostal space, rarely noticed a slight cough at the time, and found that anesthesia lasted from 15 to 20 minutes. He reported that in 150 cases he had observed no anesthetic accidents or undesirable sequelae.

It's Practical

Probably not many veterinarians in this country give anesthetic agents intrathoracically to dogs, even intractable ones, but it's not difficult to find some who routinely anesthetize their feline patients in this manner. One such person says that in his clinical records there are several hundred such cases but not a single fatality or any unfavorable sequelae among them.

Such persons are often solo practitioners, working without an assistant much or all of the time. Comparing intravenous and intrathoracic routes, they point out that it is much easier for the operator and less exciting for the cat if the estimated amount of anesthetic agent is injected by means of a small gauge needle inserted into the lung tissue. (Some contend that they do not invade lung tissue but deposit the drug in the pleural cavity.) There is no question that they induce anesthesia in this manner with considerable facility, that minimal restraint of the patient is necessary, and that induction is more prompt and more certain than with intraperitoneal injection. But the clinician who routinely treats cats intravenously, with or without assistance, will not be convinced that intrathoracic anesthesia is preferable.

But Is It Sound?

The purpose here is not to question the practicality of intrathoracic anesthesia; rather, it is to question whether the practicing clinician can be sure that objectionable lesions do not result. Surely the absence of coughing, dyspnea, or other signs of pulmonary disturbance during several days after anesthesia cannot be accepted as proof that no harm has been done.

Do we know what happens when barbiturates are deposited in lung tissue? Is it not likely that clinically inapparent lesions result (scars, ruptured alveoli, torn blood vessels), or that clinical signs of a condition such as pyothorax may not become apparent until several weeks later, when the examiner is unlikely to relate

them to the administration of the anesthetic agent? At least one cat anesthetized with an intrathoracic injection of a barbiturate developed purulent pleurisy, with exudate draining to the exterior through a fistula.[2]

Intrathoracic anesthesia could conceivably become an issue in a malpractice suit. Would the practitioner have a good case? Would expert witnesses testify that the procedure is not widely accepted by the defendant's colleagues and that its soundness has not been substantiated by adequate scientific investigation?

Research is Needed

The anesthetization of cats and smaller animals is a procedure frequently performed by veterinarians in small animal practice and in research. Surely, the question of intrathoracic anesthesia merits investigation by someone equipped to do it properly. The study should utilize considerably more than 2 or 3 cats; it should include gross and microscopic examination of lung tissue and it should extend to at least several weeks post-treatment.

There recently appeared a newspaper report of some $50,000 being spent on a project at the University of Illinois to remove the "gassiness" from beans. And some of the theses and dissertations being produced by our graduate students offer little more promise of contributing information of real value to man or beast. In contrast, either positive or negative results of a study on intrathoracic anesthesia would have much practical value.—D.A.P.

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Two Diseases—Four Names

In previous issues of the JOURNAL, articles have appeared on the subject of African swine fever. It is a disease which, clinically, is similar to hog cholera but is immunologically distinct. The disease is also called "African pig disease" to differentiate it from swine fever, which in Britain is the same as hog cholera. Therefore, African swine fever is the same as African pig disease; swine fever is the same as hog cholera. The name "African pig disease" first appeared in the *Times* (London) of Sept. 12, 1960, when an epizootic among pigs in Spain was reported. In the *British Veterinary Journal* (June, 1961, p. 229), an article by T. M. Doyle was published under the title "African Pig Disease." The author felt that the term "African swine fever" implied too close a relationship to swine fever and was, therefore, misleading.

Isolation of *Vibrio bubulus* (Florent) from Sheep

Cultures were made from the preputial mucus of 85 rams on 12 ranches and from the semen of 33 rams on 8 ranches immediately following epizootics of vibrionic abortion. In no instance was *Vibrio fetus* isolated, but 40 *Vibrio* cultures which were hydrogen sulfide-positive, catalase-negative, and had light growth in deep stab cultures were isolated from preputial mucus; 18 similar cultures were isolated from semen. All cultures tolerated 2.5% or more of sodium chloride. Similar organisms were isolated from the preputial mucus and semen of rams from a flock without recent history of abortion. On the basis of physiologic tests, the organisms appeared to be identical to four strains of *Vibrio bubulus* (Florent) isolated in France. Vaginal cultures of ewes revealed that *V. fetus* usually disappears from the vagina within a short time after abortion or lambing and is sometimes replaced with *V. bubulus,* which may persist for a considerable time. Although the investigation of epizootics of ovine vibriosis in Montana has failed to incriminate *V. bubulus* as a cause of abortion, it may have some pathogenic potential.—[*B. D. Firehammer and S. A. Lovelace: The Isolation of Vibrio bubulus (Florent) from Sheep. Am. J. Vet. Res., 22, (May, 1961): 449-461.*]

Heat-Inactivation Test for Brucellosis

Studies were conducted on the thermolability of seroagglutinins for bovine brucellosis. A heat-inactivation test (HIT) at 65 C. was devised to supplement the standard tube-seroagglutination test (STT). To prove the efficiency of the new test, serum samples from 143 artifically exposed cattle and 410 naturally exposed cattle were tested by the STT and the HIT.

Positive HIT serologic reactions were obtained from all of the artifically and naturally exposed STT suspect and reactor cattle from which *Brucella abortus* was isolated. Negative HIT serologic reactions were obtained from 74% of the artifically and naturally exposed STT suspect cattle from which *Br. abortus* was not isolated. These results suggest that the HIT could be used as a supplementary diagnostic tool to aid the eradication of bovine brucellosis.—[*T. E. Amerault, S. A. Manthei, E. R. Goode, and G. Lambert: A Heat-Inactivation Test for Differentiating Specific and Nonspecific Agglutination Reactions for Bovine Brucellosis. Am. J. Vet. Res., 22, (May, 1961): 564-569.*]

Biological Assays of Extracts of Alfalfa from Bloat-Producing Pastures

A systematic extraction procedure applied to alfalfa leaf samples harvested from bloat-producing and nonbloat-producing pastures was followed by chemical and biological assays of the resulting fractions. The results of biological assays indicated that aqueous residues, alfalfa juices, and rumen liquids were not suitable in crude forms for determining factors causing bloat. Data suggested that electrolytes markedly interfered with interpretations. The presence of materials resembling albumoses in aqueous residues appeared to be responsible for anaphylactoid clinical signs resulting from intravenous injection of nondiffusible fractions in adult cattle. Steam distillates and alkaloid fractions had no biological activity. A nonalkaloid, chloroform-soluble material which had a number of physiologic effects was found in all samples. From the chemi-

cal and biological properties of the nonalkaloid extract, the material was found to resemble flavonoids but was not tricin.—[*H. E. Dziuk, A. F. Sellers, and C. E. Stevens: Biological Assays of Extracts of Alfalfa Samples from Bloat-Producing Pastures. Am. J. Vet. Res., 22, (March, 1961): 287-297.*]

New Books

Stedman's Medical Dictionary

Each new edition of any publication that has endured the test of time is worthy of owning, and this 20th edition (50-year golden jubilee edition) of *Stedman's Medical Dictionary* is no exception. Definitions are accurate and some are especially detailed, providing information not readily found elsewhere. Generally, there is a complete listing of terms applicable to both medicine and veterinary medicine.

Illustrations though clear are not of high quality.—[*Stedman's Medical Dictionary. 20th ed. 1,680 pages; illustrated. Williams & Wilkins Co., Baltimore, Md. Price $14.95.*]

Man and Dolphin

This is a unique account of research on dolphins by a physician whose entire career has been devoted to scientific study. There are fairly detailed accounts of neurophysiologic investigations pertaining to this mammalian species and informative descriptions of its unusual anatomy. The remarkable intelligence of the dolphin, whose brain is comparable in complexity and size to that of man, is described. Of particular interest is the description of attempts to establish vocal interspecies communications between dolphins and man. Dolphins not only can vocalize but can mimic, to some extent, the human voice.

The book is medically and scientifically oriented so that it should be appealing to those in veterinary and medical sciences. It should prove especially valuable to veterinarians interested in neurophysiology and in animals in zoological gardens.—[*Man and Dolphin. By John C. Lilly. 312 pages; illustrated. Doubleday & Co., Inc., Garden City, N. Y. 1961. Price $4.95*]

Swine Science

This new edition of a work, well accepted by many in the hog industry, represents a successful attempt to update information so that it takes into account the many changes made in the swine industry in recent years. Sections have been added on confinement rearing, large scale hog units, multiple farrowing, artificial insemination, nutrition, specific pathogen-free pigs, automation, housing, and marketing.

Along with the basic information on swine husbandry and the hog industry generally, there is a useful appendix. The book is complete and authoritative and is recommended as a text and reference for veterinarians and others interested in the various phases of the swine industry.—[*Swine Science (Animal Agriculture Series). By M. E. Ensminger. 3rd ed. Interstate Printers and Publishers, Inc., 19-27 N. Jackson St., Danville, Ill. Price $8.00.*]

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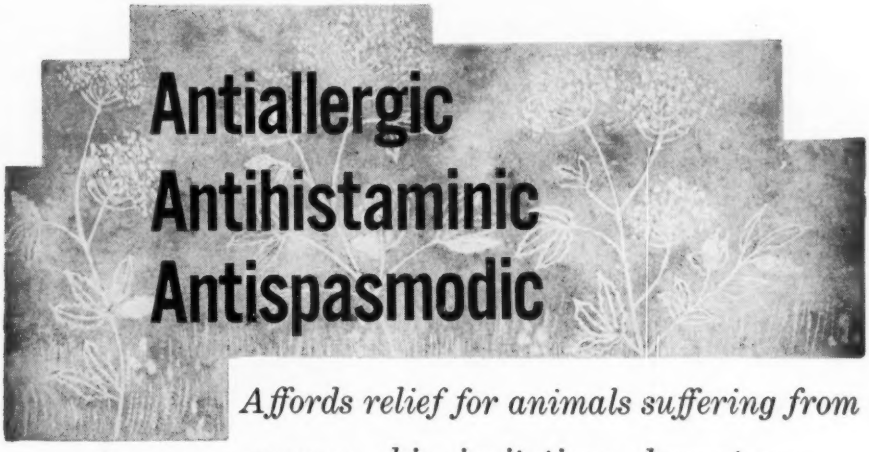

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WHAT IS YOUR Diagnosis?

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Fig. 1—Radiograph, lateral recumbent view, of the abdomen of a Boston Terrier.

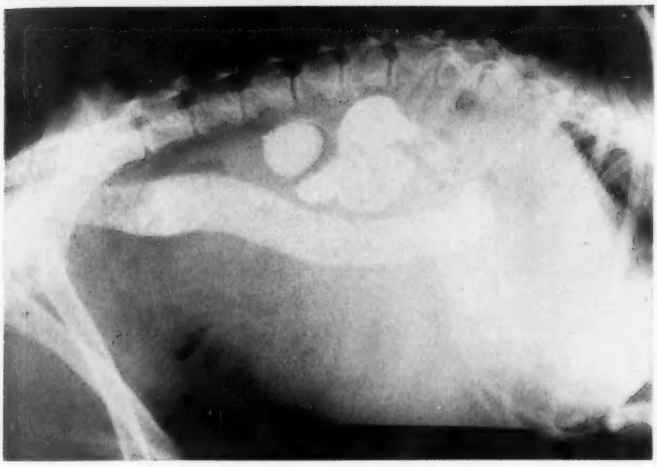

Fig. 2—Radiograph, lateral recumbent view, after barium enema.

History.—The abdomen of a male Boston Terrier, 10 years old, had enlarged gradually over a period of six months until the dog had difficulty moving and getting up and down. The abdominal contents were firm, nonfluctuating, and diffuse. Nodules could not be palpated and fluid could not be obtained by paracentesis. Appetite and bowel movements were normal. Two lateral recumbent radiographs of the abdomen were taken, one following a barium enema (Fig. 1 and 2).

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—An abdominal mass in which the cecum and colon are not involved (Fig. 3 and 4).

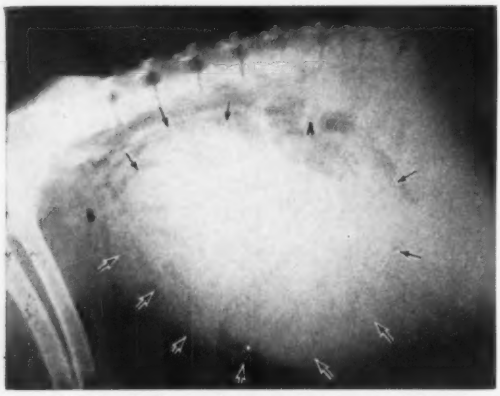

Fig. 3—Radiograph, lateral view, of abdomen of the Boston Terrier; abdominal mass (arrows), cecum (A), small intestine (B).

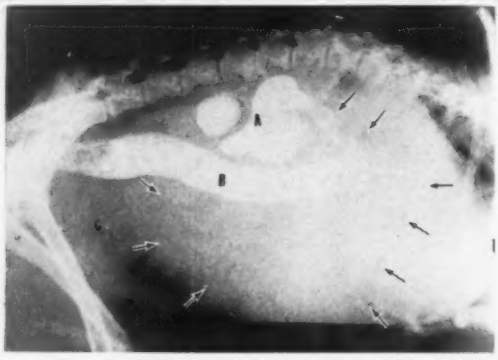

Fig. 4—Radiograph, lateral view, after barium enema; mass (arrows), cecum (A), colon (B), and small intestine (C).

Comment.—At surgery the spleen with a massive tumor weighing 4 lb. was removed. On histologic examination the mass was found to be a hemangioma. The spleen and tumor in this case were not photographed. In dogs past middle age, splenic tumors are not uncommon. Most primary splenic tumors are composed of vascular elements. Pictures of two spleens with hemangiomas are shown (Fig. 5 and 6). Frequently these tumors become so large that they rupture spontaneously or from relatively mild trauma. Rupture usually results in hemoperitoneum and possibly death from hemorrhage.

A splenic hemangioma rarely metastasizes, but transplants to the abdominal viscera following rupture are a common finding. Occasionally, metastatic tumors are found in the spleen, but these are usually multiple and rarely reach the size of this tumor.

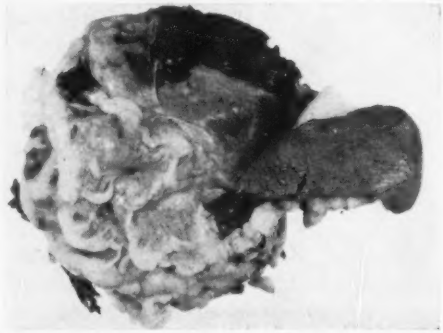

Fig. 5—Spleen containing a hemangioma with omentum adhered to the mass.

Fig. 6—Spleen with tumor growing from visceral dorsal surface.

This report was submitted by J. Raymond Currey, V.M.D., Washington, D.C., and prepared with the assistance of Wayne H. Riser, D.V.M., M.S., Kensington, Md.

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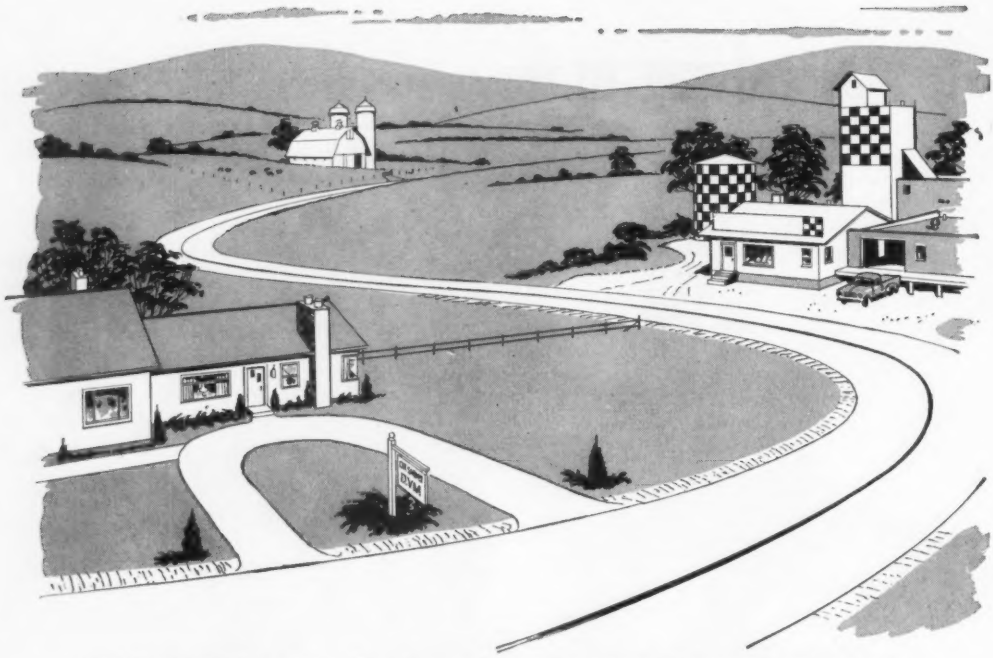

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Assistant Professor of Veterinary Surgery

J. E. Prier, D.V.M., Ph.D.

Associate Professor of Virology

Presentation of Case

*Dr. J. W. Buchanan.**—On Nov. 7, 1960, a male Miniature Poodle 8 months old was admitted to the University of Pennsylvania veterinary hospital. The dog had been operated on for an umbilical hernia in July, 1960, at which time it was given anti-distemper-hepatitis serum. Since that time, severe attacks of dyspnea had occurred, sometimes as often as three times a day. They were characterized by rapid, open-mouthed, deep respirations which were associated with generalized ataxia, weakness in the hindlegs, occasional fainting, restlessness, and drooling of foamy material. The dog had intermittent ascites but no coughing.

On physical examination, the body temperature was 102 F., respiration rate 44 (labored), heart rate 152 (no pulse deficit), and blood pressure 115/70. There was a loud (grade 4), systolic murmur with a palpable thrill at the left third to fourth intercostal space, as well as a grade 3 systolic murmur with a thrill at the right third intercostal space. Cyanosis and loud, moist rales in all lung fields were also present. There was no ascites. The other organs and systems were not abnormal. The mean

*Dr. Buchanan is instructor in cardiology.

LABORATORY DATA

Data	11-7-60	12-2-60	Percent O_2 saturation		Pressure (mm. Hg)
Total white blood cells	20,700	9,700	Aorta	75	100/65*
Segmented neutrophils	67%	65%	Lt. ventricle	71	114-128/6-8*
Nonsegmented neutrophils	2%	5%	Lt. atrium	66	.....
Lymphocytes	19%	11%	Rt. atrium	51	.....
Monocytes	11%	16%	Rt. ventricle	52	190/10
Eosinophils	1%	3%	Cranial vena cava	56.5	.....
Packed cell volume	53%	46%	Caudal vena cava	45	.....
Hemoglobin	20.7 Gm./ 100 ml.	14.7 Gm./ 100 ml.	.....	.....	.....

3 nucleated red blood cells/100 white blood cells; microfilaria negative; fecal examination: light trichuriasis.

*Not determined simultaneously.

electrical axis in the electrocardiogram was plus 250 degrees. Marked right and some left cardiac enlargement was seen on survey radiographs. Angiocardiography was performed by inserting a catheter into the right jugular vein. There was a prominent bulge in the region of the cranial heart base, a thickened right ventricle, and the presence of radiopaque dye in the aorta within three seconds after injection. Right- and left-side heart catheterizations were performed November 22.

Following these diagnostic procedures, the temperature elevations which developed were controlled with antibiotic therapy. Intermittent bloody diarrhea also was a problem but did not seriously affect the animal. The dog did not have noticeable dyspnea while in the hospital, and it was not digitalized until December 8 when coughing and heavier respirations were noticed.

Case Discussion

*Dr. D. K. Detweiler.**—The first thing to note in this case is that the condition occurred in a young dog. This immediately makes one think of a congenital lesion. The history reports clinical signs referable to the respiratory tract and evidence of failure of the right ventricle (intermittent ascites). The loud moist rales in all lung fields suggest the possibility of a left-sided heart lesion. The hematologic findings suggest polycythemia, since the hemoglobin exceeds 20 Gm./100 ml. of blood. Since cyanosis was observed during the initial physical examination, it is possible that we are dealing with polycythemia secondary to chronic anoxemia. However, in the second blood study the hemoglobin level decreased. The history of bloody diarrhea could account for this significant change in hemoglobin level between the two determinations. The presence of a loud systolic murmur at the left third or fourth intercostal space in a young dog immediately suggests two possibilities based on the prevalence rates of congenital heart disease in the dog. The most common congenital lesion in the dog is pure pulmonic stenosis. This produces a harsh systolic murmur, often in the third left intercostal space and in the third right intercostal space at the edge of the sternum. Thus, a diagnosis of pulmonic stenosis would be consistent with these auscultatory findings. However, aortic stenosis is also not rare in the dog. It occurs as a congenital lesion which may produce a harsh systolic murmur in the same general area on the left side of the thorax. Thus the auscultatory findings can only be considered suggestive but not diagnostic.

We may now add to that the electrocardiographic findings. The mean electrical axis in the electrocardiogram has rotated markedly to the right. This indicates marked right ventricular enlargement; aortic stenosis would cause left ventricular enlargement. Thus far the findings favor a diagnosis of pulmonic stenosis.

The presence of cyanosis does not fit in with the diagnosis of pure pulmonic stenosis and must be explained. Ordinarily, in a young animal, cyanosis in the presence of heart disease suggests the possibility that there is a "right to left" shunt in which venous blood bypasses the lungs and reaches the systemic arterial circulation.

Now, turning to the radiographic and angiocardiographic findings, the first thing I notice in the right lateral thoracic radiograph is that the cardiac silhouette appears to be longer than normal in its dorsoventral diameter. This is indicated by the fact that the trachea is parallel with the spine; that is, the normal angle between the trachea and the spine has been decreased. Second, at the terminal end of the trachea, there is a definite bowing upward of the trachea as it passes over the region of the right atrium. This suggests enlargement of the right ventricle or the right atrium or both. Third, the two mainstem bronchi are somewhat separated so that they form a V-like structure. This is a change that we often see when there is enlargement of the left atrium. The cranial border of the shadow is straightened to some extent, suggesting enlargement of the right side of the heart. The caudal border of the heart is also straightened to some extent suggesting left-sided heart enlargement. The dorsoventral radiograph is confusing to some degree. Two findings usually associated with pure pulmonic stenosis are absent. First, poststenotic dilatation of the pulmonary artery is usually seen as an enlargement along the left cranial border of the heart. Second, the right cranial border of the cardiac silhouette often has an an-

*Dr. Detweiler is associate professor of pharmacology.

gular appearance which is probably caused by massive enlargement of the right atrium. However, a third finding is present —that of a greatly enlarged cardiac silhouette to the right of the midline. This view of the heart does not strongly support the diagnosis of pure pulmonic stenosis; however, it is not inconsistent with it. In summary, these two radiographs indicate enlargement of the entire heart, involving chiefly the right ventricle.

The initial series of angiocardiograms were taken with the dog in the left lateral position. The first angiocardiogram, taken one second after the rapid injection of contrast medium, shows filling of the right atrium and cranial vena cava. In the second angiocardiogram, taken at three seconds, there is contrast medium present in the right atrium, the right ventricle, and possibly in the left ventricle. The pulmonary arteries have begun to opacify and, although it is debatable, I think the aorta is opacifying simultaneously with the pulmonary arteries. The left atrium and pulmonary veins leading into the left atrium appear to have about the same opacity as the aorta. This suggests that the aorta is opacifying at about the same time as the left atrium, obviously an abnormal situation. In the third angiocardiogram, taken at five seconds (Fig. 1), opacification of the aorta and pulmonary arteries is about equal. Some contrast medium is still evident in both ventricles and both atriums. Thus, in this series of angiocardiograms, it appears that the contrast medium has somehow gained access to the left side of the heart shortly after it was injected into the right atrium, since the aorta and pulmonary arteries are opacifying simultaneously. This establishes the presence of a right to left shunt, but I don't think we can be absolutely sure from this series of angiocardiograms where the shunt is located.

The second series of angiocardiograms, also taken with the dog in the lateral position, are extremely revealing with respect to the location of the shunt. In taking these records, the catheter was advanced through the cranial vena cava and the right atrium into the caudal vena cava so that the contrast medium was actually injected into

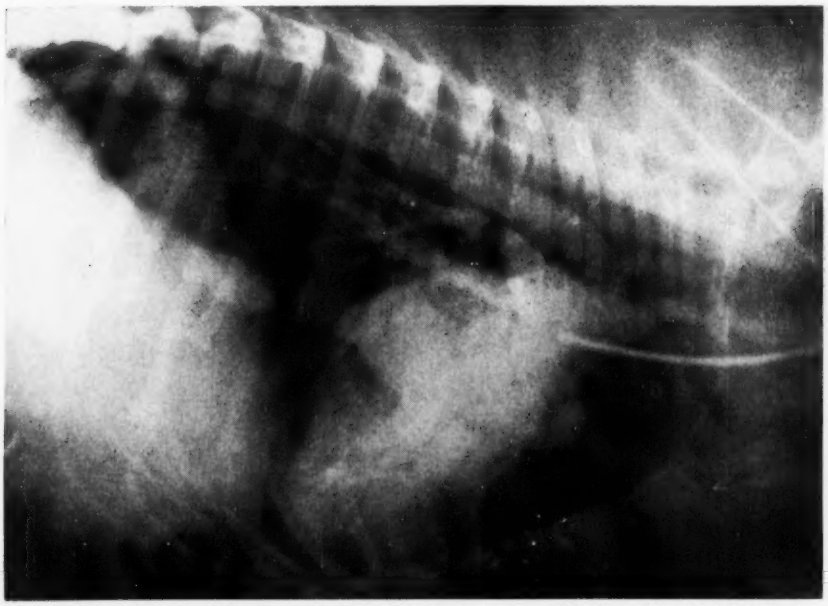

Fig. 1—Left lateral angiocardiogram taken five seconds after injection of radiopaque dye into the cranial vena cava. The aorta and pulmonary arteries are simultaneously opacified, indicating some type of right to left shunting of blood in the heart. The wall of the right ventricle is markedly thickened. The main artery is dilated.

the caudal vena cava. In the first picture, taken at one half second, the contrast medium is seen filling part of the caudal vena cava and the right atrium. The second angiocardiogram, taken at three seconds, indicates that the contrast medium flowed almost immediately into the left ventricle and strongly opacified the aorta (Fig. 2); the aorta contains much more contrast medium than the pulmonary arteries. This flow of blood is reminiscent of the fetal circulation; that is, the oxygenated blood in the fetal circulation approaches the heart through the ductus venosus into the caudal vena cava, into the right atrium, through the foramen ovale into the left atrium, so that much of the blood bypasses the lungs in reaching the aorta. In the fetus, there is relatively little mixing of this oxygenated blood coming from the placenta into the right side of the heart through the cephalic vena cava. Thus, in this case, the pattern of circulation found in the fetus appears to have persisted, because it is evident that the contrast medium has passed into the left ventricle with relatively little mixing with the blood in the right atrium, thus accounting for the fact that the aorta contains so much more contrast medium than the pulmonary vessels in this series. This difference in behavior of the contrast medium when injected into the caudal vena cava, as contrasted with its behavior when injected into the cranial vena cava, suggests that in this heart the foramen ovale has failed to close. It does not rule out the possibility of an atrial septal defect, however, although in the presence of a large atrial septal defect one would anticipate better mixing of the contrast medium in the right atrium than is apparent here.

In the third angiocardiogram, taken five seconds after injection of contrast medium, the aorta still contains some contrast medium. Both atriums, the pulmonary veins, the aorta, and the left ventricle are slightly opacified but at no time in this series of three angiocaridograms have the pulmonary arteries been opacified. It appears that in this series most of the contrast medium bypassed the pulmonary circula-

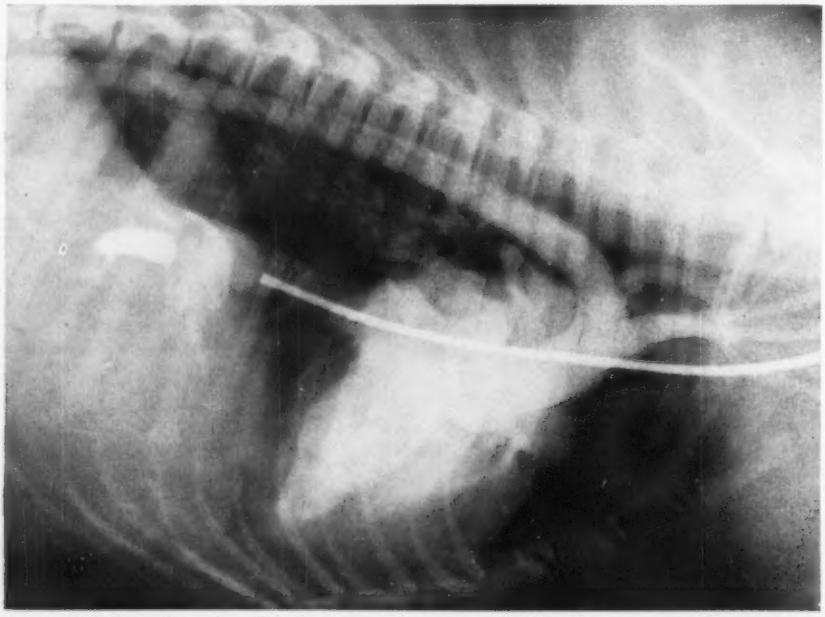

Fig. 2—Left lateral angiocardiogram taken three seconds after injection of radiopaque dye into the caudal vena cava. The left ventricle and aorta are densely opacified while little dye is presented in the right ventricle and pulmonary arteries. This suggests a patent foramen ovale, since blood from the caudal vena cava apparently is reaching the left side of the heart with less mixing than blood from the anterior vena cava.

tion through a defect between the two atria. I can think of no other circumstance which would account for the course followed by the blood in this series of angiocardiograms. The ventricular walls, especially the right, are markedly thickened in these angiocardiograms. The dorsoventral angiocardiograms do not add diagnostic information.

Looking at the oxygen saturation, we see that the blood in the right atrium was less saturated than the blood in the cranial vena cava. Such variations are likely to occur in a normal dog. The blood in the left atrium (66% saturated) contained relatively less oxygen than the blood obtained from the left ventricle and aorta, suggesting that there is a shunt passing unoxygenated blood into the left atrium. Presumably, at the time the sample was taken, this venous blood was not completely mixed with the oxygenated blood also arriving at the left atrium, so that a relatively greater amount of unoxygenated than oxygenated blood was drawn up in the sampling syringe. This would account for the fact that the oxygen content was lower in the blood samples from the left atrium than in those from the left ventricle and aorta.

The blood pressure values were higher in the right ventricle than in the left ventricle or aorta. That the pressure in the right ventricle exceeded that of the systemic pressure was strong presumptive evidence that the interventricular septum was intact.

Adding all of these observations together, the diagnosis would be congenital stenosis of the pulmonic valve (we have not ruled out the possibility of subvalvular stenosis), in the presence of a patent foramen ovale or possibly a very small atrial septal defect. I think it must be patent foramen ovale.

Clinical Diagnosis

1) Congenital pulmonic valvular stenosis.
2) Patent foramen ovale.

Surgical Findings

*Dr. D. F. Patterson.**—A thoracotomy was performed at the right fifth intercostal space on December 21. Upon opening the pericardial sac, a 10 cm. portion of omentum (Fig. 3) was seen to cover the lateral surface of the ventricles. The origin of the omentum was traced to a small opening between the apex of the pericardial sac and the peritoneal cavity, a true diaphragmatic-pericardial hernia.[1] The omentum was ligated and amputated, and the stump was replaced into the peritoneal cavity.

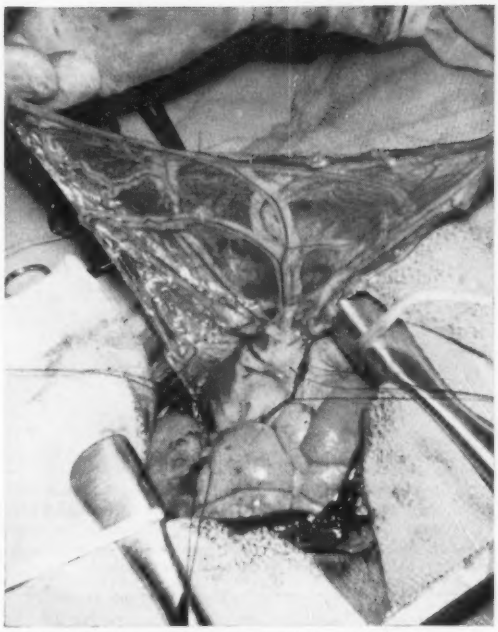

Fig. 3—Omentum in the pericardial sac. This evidence of a rarely seen diaphragmatic-pericardial hernia was an unexpected finding at the time of surgery. The omentum was ligated and removed without difficulty.

The right ventricle was extremely enlarged and a thrill could be felt in the dilated pulmonary artery during systole. A small incision was made in the right ventricular outflow tract and a Brock valvulotome was introduced into the incision and passed several times through the pulmonary valve area. Only slight lessening of the thrill resulted and it was felt that the procedure was unsuccessful due to marked obstruction of the right ventricular outflow tract by the hypertrophied myocardium. (Adequate correction of this stenosis would require open heart surgery performed with heart-lung bypass.)

*Dr. Patterson is instructor in cardiology.

Fig. 4—Pulmonary semilunar valves viewed from the main pulmonary artery. All the semilunar cusps were fused with the exception of a small 1 mm. orifice. The main pulmonary artery is dilated (poststenotic dilation).

Fig. 5—The right ventricle is thickened, with narrowing of its outflow tract. A 2 mm. applicator stick reduced to 1 mm. diameter has been passed through the orifice of the stenotic pulmonary semilunar valves.

The myocardial, pericardial, and thoracic incisions were closed and the dog recovered from the surgery without complication. However, on Jan. 15, 1961, the dog became cyanotic, staggered, and collapsed. It was revived by oxygen therapy and progressed with mild dyspnea for five more days. On January 20, the dog appeared all right at 9:00 p.m. but was found dead at midnight.

Pathologic Findings

*Dr. K. Hubben.**—The postmortem findings substantiate the clinical diagnosis. On gross examination, the heart had the following abnormalities: the right ventricle was markedly thickened (Fig. 5) and on cut section the myocardium was pale and mottled. The pulmonic valve opening (Fig. 4) was narrowed by fusion of the cusps to

*Dr. Hubben is assistant professor of veterinary pathology.

Fig. 6—Patent foramen ovale viewed from the right atrium.

a 1-mm. valve orifice. The foramen ovale was patent (Fig. 6). Other findings grossly and histologically were minor and mostly related to congestive heart failure.

Comments

Dr. J. Buchanan.—I would like to point out that normally, in doing cardiac catheterizations, particularly in cases of suspected valvular stenosis, we always attempt to get a pressure recording on both sides of the involved valve to determine the presence of a gradient (difference in pressure across the valve). In this case, the pulmonic valve was so stenotic that we could not get a catheter through it.

Dr. R. S. Brodey.—How often do you find these two lesions present in the same animal?

Dr. Buchanan.—This is the second case I have seen in three months; however, in the earlier one, the atrial septal defect was larger than just a patent foramen ovale. I would like to refer your question to Dr. Patterson who has had more experience in this field than I.

Dr. Patterson.—In a series of 3,000 dogs screened for cardiovascular disease in our clinic, we found 6 with pulmonic stenosis —about 2 per 1,000 dogs examined. One of these also had a patent foramen ovale with a right to left shunt.

The coexistence of these two lesions is not surprising when one considers the effects of pulmonic stenosis on the circulation. Normally, at birth the pulmonary vascular resistance falls as the lungs expand. This allows more venous blood to flow through the lungs and causes a decrease in pressure in the right side of the heart. At this time, left atrial pressure usually rises above right atrial pressure, and a membranous flap on the left side of the septum forms a valve over the foramen ovale. This valve prevents blood from flowing from left to right, but should right atrial pressure again rise above left for any reason, flow through the foramen from right to left might be re-established. In pulmonic stenosis, the right ventricular pressure remains high because outflow through the small valve orifice is impeded. Right ventricular pressure can be considerably elevated for some time without any significant rise in right atrial pressure. If the ventricle becomes unable to empty itself adequately, however, as occurs in congestive heart failure, right atrial pressure will rise. At this point, perhaps after the animal has reached maturity, the foramen ovale may open, and right to left shunting may occur, at which time the dog becomes cyanotic.

Pathologic Diagnosis

1) Congenital pulmonic valvular stenosis.
2) Patent foramen ovale.
3) Diaphragmatic pericardial hernia.

Reference

[2]Detweiler, D. K., Brodey, R. S., and Flickinger, G. L.: Diagnosis and Surgical Correction of Peritoneopericardial Diaphragmatic Hernia in a Dog. J.A.V.M.A., 137, (Aug. 1, 1960): 177-182.

Foreign Breeds Resemble American Dogs

Many American tourists are amazed to find breeds of dogs in foreign lands which closely resemble American breeds but which share no common ancestors. An example of this is the Vastgotaspets, a small, short-legged dog resembling the Welsh Pembroke Corgi. This breed, like the Corgi, is an old one in Sweden. The theory is that ships sailing between Sweden and Wales probably carried the dogs back and forth, but which country should be credited with the original stock is debatable.

The Jamthund, a dog commonly shown in Sweden, is a bit leggier than our Norwegian Elkhound but could easily be mistaken for an Elkhound. The Hamiltonstovare is Harrier-like in appearance and closely resembles the Foxhound, although usually is not as large.—*Dog World (Feb., 1961): 10.*

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- **9-YEAR-OLD HOLSTEIN—ACUTE EDEMA OF UDDER; BREAKDOWN OF ATTACHMENTS**—Udder was supported. Cow was given 2 Gm. DIURIL b. i. d. for 3 days. Condition much improved in three days.
- **2-YEAR-OLD FRESH HEIFER—ACUTE EDEMA OF UDDER, TEATS AND ABDOMEN**—2 Gm. of DIURIL given b. i. d. for 3 days. In 24 hours, teats had softened considerably.
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J. F. Smithcors, D.V.M., Ph.D.

History of the AVMA

1918

At the annual meeting in Philadelphia in 1918, President Fred Torrance stated, "The war found our profession in America unprepared," and pointed out, "War has demonstrated the value of the veterinary profession to the nation and increased its importance as a necessary cog in the machinery of modern life. . . .The demand for well educated veterinarians, not only for war, but to care for the enormously valuable livestock of the country, . . . will increase the attendance at our veterinary colleges, will render it easier for these to obtain the financial support necessary . . . and render possible a high standard of education and efficiency."

Special mention was made of the deaths of past presidents A. Liautard, A. D. Melvin, and S. Stewart. Dr. Melvin's portrait, along with those of his predecessor as BAI chief, D. E. Salmon, his successor, J. R. Mohler, J. Law, and L. Pearson were exhibited. The portraits were for the art gallery of the Saddle and Sirloin Club of Chicago. These men, all past presidents of the AVMA, also were related academically. Mohler had been a student under Pearson; Pearson and Salmon had studied under Law; and Salmon had been the teacher of Melvin.

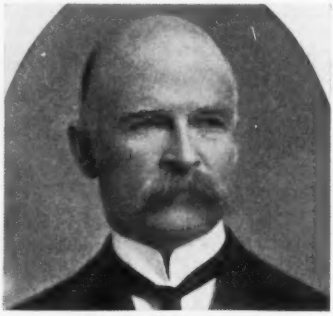
Later, in presenting the portraits to the Club, V. A. Moore said, "We cannot at this time measure the value to humanity of the work and influence of these truly great and good men. They will stimulate others to greater effort . . . because they possessed the master words of success—character and work. Their labors have extended over a period of fifty years, the most prodigious period of change the world has ever known . . . wherein are written our knowledge of animal diseases, the progress in American veterinary education and the history of our animal industry." The portraits were lost in the disastrous stockyards fire in 1934.

About 1,000 new AVMA members, many from the BAI and the V.C., were admitted. V. A. Moore was elected president; N. S. Mayo, secretary; and M. Jacob, treasurer. P. A. Fish resigned as editor of the AVMA Journal to enter military service, and W. H. Dalrymple was appointed successor. However, because of failing health, Dr. Dalrymple resigned the next year, and J. R. Mohler assumed the editorship.

At a luncheon meeting in 1917, Mrs. A. T. Kinsley presiding, the AVMA Women's Auxiliary was formed. The first officers were: president, Mrs. W. H. Hoskins; corresponding secretary, Mrs. A. Lockhart; recording secretary, Mrs. C. E. Cotton; and treasurer, Mrs. H. Jensen. In 1918, a constitution and bylaws were adopted, including the Auxiliary's object: ". . . to give necessary financial assistance to the family of any veterinarian engaged in war work if his life has been forfeited in pursuance of such work, or if he has been temporarily or permanently disabled." In 1920, the present Loan Fund was established, in part with monies collected for the initial objective. The membership, about 55 in the original group, increased to more than 6,000 in 40 years.

* * *

FRED TORRANCE was born in Montreal, July 13, 1859, and attended McGill University, where he received the B.A. and D.V.S. degrees, the latter in 1882. After his pioneer practice at Brandon, Manitoba, he moved to Winnipeg in 1892, where he became well-known in the veterinary profession. From 1912 to 1923, he



Dr. Fred Torrance

was Veterinary Director General for the Dominion of Canada and, in 1923, became professor of physiology and hygiene at Ontario.

Under his leadership, dourine was eradicated from the western provinces, glanders was practically eliminated, and major campaigns were waged against mange and tuberculosis in cattle, and cholera in hogs. The latter centered on the elimination of feeding raw garbage. A man of great personal warmth, ". . . he endeared himself to the students," at Ontario, and was ". . . a staunch friend and able colleague" to the staff.

Dr. Torrance served as president of the Manitoba association, honorary president of the Ontario association, vice-president of the AVMA (1900 and 1913), and AVMA president (1917). He died on June 29, 1924.

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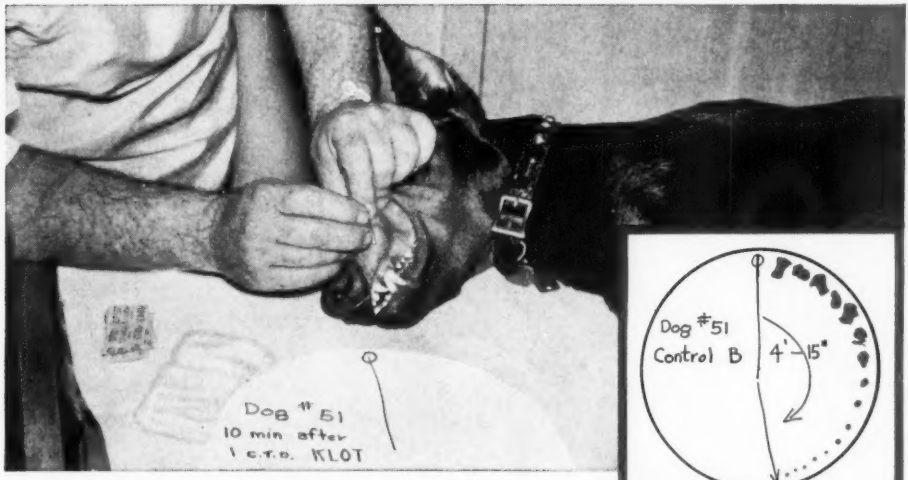

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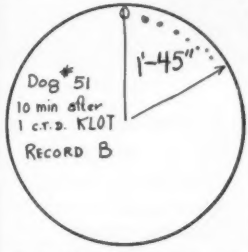

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The high intelligence of monkeys and their natural mechanical-mindedness make it extremely difficult to find secure hiding places in the house for anything that must be kept out of reach. The medicine cabinet, especially, must be equipped with a monkey-proof lock.—*All Pets (Feb., 1961): 24.*

Dr. R. C. Stephens Joins Moorman Manufacturing Company

Dr. Roger C. Stephens (ILL '60) has joined the veterinary research staff of the Moorman Manufacturing Company.

Dr. Stephens had formerly been in practice with Dr. George Lantis (OSU '43), Quincy, Ill., and Dr. S. R. Anderson (ISU '50), Newark, Ill.

Radiologic Defense for Agriculture

Veterinarians and other technically trained people are being asked to help instruct citizens on the effects of radiation and the principles of protection from radiation. Emergency plans and preparedness programs for radiologic defense as they affect livestock, crops, meat and poultry, and agriculture generally are being drawn up by USDA. However, the assistance of veterinarians and others will be needed for dissemination of this information within local communities.—*USDA Release, July 5, 1961.*

AVMA Research Fellowship Available

The Council on Research of the AVMA announces the availability of a number of fellowships for postgraduate training for the academic year, 1962-1963.

The recipient of a fellowship must be a veterinarian and a citizen of the United States or Canada. Veterinary students who expect to graduate at the end of the current school year and who wish to follow a career in research may apply for a fellowship.

It is advisable that completed application forms be filed by Jan. 1, 1962, to allow time for correcting omissions and for some reasonable delay in arrival of letters of information from third parties. The latest date for filing the completed application is Feb. 1, 1962. Approximately one month is required for processing completed applications after receipt by the Council. Qualified persons should secure and submit applications as early as possible to insure their file being complete for presentation to the Committee on Fellowships.

The Committee on Fellowships of the Council on Research will meet early in March to consider applications and the awards will be announced soon afterward. The stipend will be determined in each case by the needs of the individual, the location of the school in which he proposes to work, and other factors. In general, the stipends range from $100 per month upward. Any qualified person interested in graduate training may obtain application blanks and other information from the deans of the various colleges of veterinary medicine or by writing to the Council on Research, American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill.

Public Relations

Symbols of Professional Prestige

A new symbol of AVMA membership, along with several which have been available for some time, deserves attention.

AVMA Automobile Emblem

Members of several professions display, on their automobiles, emblems denoting their professional status. Such emblems announce to the viewer that the owner of the vehicle is a professional man. In emergency situations, when an automobile must be parked in prohibited space, the emblems announce the importance of the mission and sometimes, though not always, preclude reprimands (or worse).

The usual versions of these emblems are bracketed to the license plate of the car. Today's automobiles, with their radical styling and variety of license plate arrangements, sometimes cannot accommodate the bracketed emblem.

The AVMA's new automobile insignia is different. It has an adhesive backing which makes it easy to apply to the surface of the automobile, even when the surface is slightly contoured. Three inches in diameter, it is a buffed bronze metal with maroon and gold baked-enamel finish. The veterinary caduceus appears in the center in bronze, surrounded by a maroon field and circumscribed with the words "American Veterinary Medical Association."

The automobile emblem is available at $2.50 each from the AVMA Department of Membership Services.

AVMA Decalcomania

Similar to the automobile emblem, but suitable for a wider variety of purposes, is the AVMA decal. It can be applied to any smooth surface and presents an attractive announcement of membership in the national association. In format, design and color, it is identical to the automobile emblem described.

The AVMA decal is especially suitable for use in clinics and animal hospitals. Its restrained message is an ethical announcement to the client that the veterinarian holds membership in his professional association. Decals are available at cost (.25 each) from the AVMA.

The Code of Ethics (Veterinarian's Oath)

Perhaps the most attractive and meaningful of Association emblems is the Veterinarian's Oath. Printed on heavy stock parchment and richly adorned with illuminated lettering in blue, gold, and maroon, the Oath announces the ethical code of veterinary practice. While all members of the profession are aware of their Code of Ethics, it is a worthy message to clients and other members of the public and aids in instilling confidence and respect for the practitioner. It bears the following message:

> Being admitted to the profession of veterinary medicine, I solemnly dedicate myself and the knowledge I possess to the benefit of society, to the conservation of our livestock resources, and to the relief of suffering of animals. I will practice my profession conscientiously with dignity. The health of my patients, the best interest of their owners, and the welfare of my fellow man, will be my primary considerations.
>
> I will at all times be humane and temper pain with anesthesia where indicated. I will not use my knowledge contrary to the laws of humanity, nor in contravention to the ethical code of my profession. I will uphold and strive to advance the honor and noble traditions of the veterinary profession.
>
> These pledges I make freely in the eyes of God and upon my honor.

The Veterinarian's Oath is suitable for framing and is available at $1.00 each.

Because all of the insignia listed above are intended to indicate the affiliation of the veterinarian with the AVMA, their sale is limited to members of the AVMA in good standing. They may be ordered at any time from the Department of Membership Services.

R. D. MORRISON
Director of Membership Services

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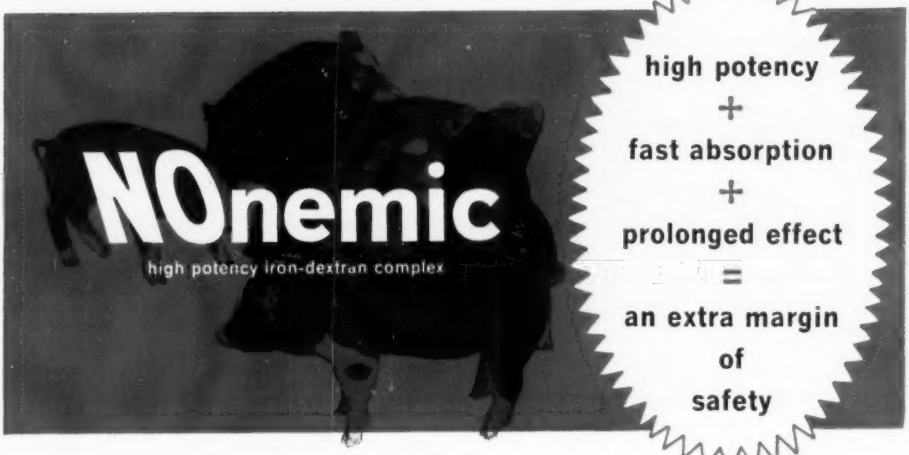

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Coming Meetings

Notices of coming meetings must be received 30 days before date of publication.

September, 1961

Northern Illinois Veterinary Medical Association. Wagon Wheel Lodge, Rocton, Ill., Sept. 20, 1961. Dr. H. S. Fike, P.O. Box 325, McHenry, Ill., secretary.

Animal Care Panel. 12th annual meeting. Statler Hilton Hotel, Boston, Mass., Sept. 27-29, 1961. Dr. Bernard F. Trum, Sherborn, Mass., general chairman.

Oregon Veterinary Medical Association. Fall clinic meeting. Corvallis, Ore., Sept. 28-30, 1961. Dr. K. J. Peterson, Office of the Secretary, Poultry-Veterinary Building, Corvallis, Ore., program chairman.

Colorado Veterinary Medical Association, Inc. Annual convention. Harvest House, Boulder, Colo., Sept. 29-Oct. 1, 1961. Mr. Claude Ramsey, 531 Guaranty Bldg., Denver, Colo., executive secretary.

October, 1961

New England Veterinary Medical Association. Annual meeting. Poland Springs Hotel, Poland Springs, Maine, Oct. 1-4, 1961. Dr. C. Lawrence Blakely, 180 Longwood Ave., Boston, Mass., secretary.

New York State Veterinary Medical Society. 70th annual meeting. Saranac Inn, New York, Oct. 3-7, 1961. Dr. C. D. Ebertz, 84 Grant Ave., Auburn, N.Y., program chairman.

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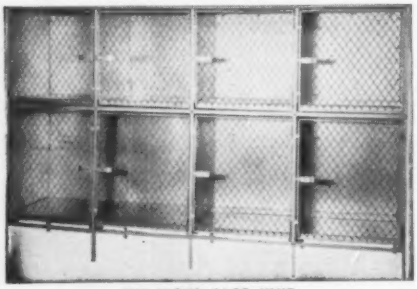

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Purdue University. 49th annual conference for veterinarians. Purdue University, School of Veterinary Science and Medicine, Lafayette, Ind., Oct. 5-7, 1961. Dr. Erskine V. Morse, Purdue University, School of Veterinary Science and Medicine, Lafayette, Ind., dean.

Symposium on Recent Developments in Research Methods and Instrumentation. 11th annual instrument symposium and research equipment exhibit. National Institutes of Health, Bethesda 14, Md., Oct. 9-12, 1961. Mr. James B. Davis, National Institutes of Health, Bethesda 14, Md., executive secretary.

Interstate Veterinary Medical Association. 47th annual meeting. Sheraton-Martin Hotel, Sioux City, Iowa, Oct. 12-13, 1961. Dr. D. W. Rubel, 3209 Thirty-Eighth St., Sioux City, Iowa, secretary.

Eastern Iowa Veterinary Association. Annual meeting. Sheraton Montrose Hotel, Cedar Rapids, Iowa, Oct. 12-13, 1961. Dr. William R. Goodwin, Newhall, Iowa, secretary.

University of Illinois. 42nd Annual Conference and Extension Short Course for Veterinarians. College of Veterinary Medicine, University of Illinois, Urbana, Ill., Oct. 19-20, 1961. Dr. L. E. St. Clair, Department of Veterinary Anatomy and Histology, conference chairman.

Illinois Veterinary Medical Conference and Short Course. University of Illinois, Urbana, Oct. 19-20, 1961. Dean C. A. Brandly, College of Veterinary Medicine, University of Illinois, Urbana, Ill.

Gaines Symposium. University of Illinois, Urbana, Ill., Oct. 20, 1961. Mr. Harry Miller, Gaines Dog Research Center, 250 Park Ave., New York 17, N.Y., director of the Dog Research Center.

Midwest Feed Manufacturers' Association. Centennial Nutrition conference, Kansas City, Mo., Oct. 21-25, 1961. Fennell-Gibson Public Relations, 2201 Grand Ave., Kansas City, Mo.

Southern Veterinary Medical Association. Annual meeting. Thomas Jefferson Hotel, Birmingham, Ala., Oct. 22-25, 1961. Dr. A. A. Husman, Box 91, Raleigh, N.C., secretary.

Florida State Veterinary Medical Association. 32nd annual convention. Deauville Hotel, Miami Beach, Fla., Oct. 22-24, 1961. Dr. M. W. Emmel, P.O. Box 340, Gainesville, Fla., executive secretary.

California Veterinary Medical Association. Annual meeting. Long Beach, Calif., Oct. 23-25, 1961. Mr. Kenneth Humphreys, 3004 Sixteenth St., Rooms 301-303, San Francisco 3, Calif., executive secretary.

Missouri, University of. 37th annual veterinary conference. Columbia, Mo., Oct. 30-31, 1961. Dr. Cecil Elder, Department of Veterinary Pathology, School of Veterinary Medicine, University of Missouri, Columbia, Mo., chairman.

United States Livestock Sanitary Association. Curtis Hotel, Minneapolis, Minn., Oct. 30-Nov. 3, 1961. Dr. R. Hendershott, 33 Oak Lane, Trenton, N.J., secretary.

Veterinary Laboratory Diagnosticians. 4th annual meeting. Curtis Hotel, Minneapolis, Minn., Oct. 30-31, 1961. Dr. E. Pope, 4922 Holiday Dr., Madison 5, Wis., secretary.

National Assembly Chief Livestock Sanitary Officials. Curtis Hotel, Minneapolis, Minn., Oct. 30-31, 1961. Dr. M. N. Riemenschneider, 122 State Capitol, Oklahoma City, Okla., secretary.

National Association of Federal Veterinarians. Annual meeting. Curtis Hotel, Minneapolis, Minn., Oct. 31, 1961. Dr. F. L. Herchenroeder, Box 3085, Parkfairfax Station, Alexandria, Va., secretary.

November, 1961

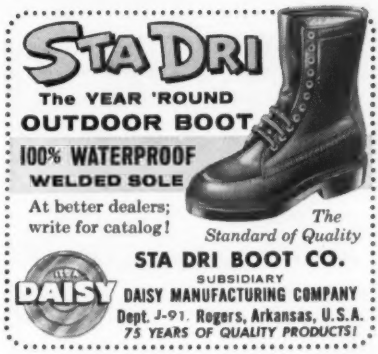
Mississippi Valley Veterinary Medical Association. Hotel Pere Marquette, Peoria, Ill., Nov. 1-2, 1961. Dr. R. C. Williams, 3721 Fifth Ave., Moline, Ill., secretary.

Michigan Nucleonic Society. Detroit, Mich., Nov. 10, 1961. Dr. L. E. Preuss, Department of Physics, Edsel B. Ford Institute for Medical Research, Henry Ford Hospital, Detroit 2, Mich., chairman.

American Public Health Association. 89th annual meeting. Cobo Hall, Detroit, Mich., Nov. 13-17, 1961. Dr. Berwyn F. Mattison, American Public Health Association, 1790 Broadway, New York 19, N.Y., executive director.

Foreign Meetings

Twelfth World's Poultry Congress. Show Grounds of the New South Wales Royal Agricultural Society, Sydney, Australia, Aug. 13-18, 1962. Dr. Cliff D. Carpenter, chairman, U.S. Participation Committee, 1207 Emerald Bay, Laguna Beach, Calif.; Dr. A. William Jasper, secretary, c/o AFBF, 2300 Merchandise Mart, Chicago 54, Ill.



Dr. W. David Fletcher Accepts Research Position

Dr. W. David Fletcher (GA '61) has accepted a position as research veterinarian for Central Soya, Fort Wayne, Ind.

Dr. Fletcher will be primarily concerned with field research and service in the southeastern area. He will be located at Chattanooga, Tenn.

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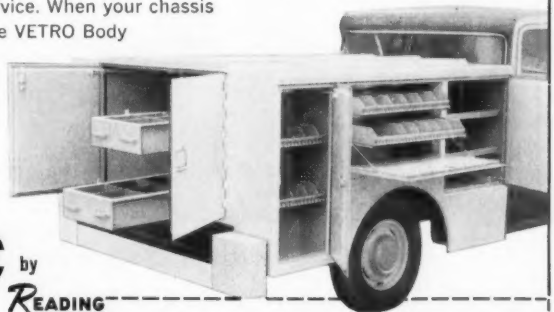

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Feline Economics

Last year about half a billion cans of cat food were sold in the United States. Cat litter by the millions of pounds was sold over the pet shop counters and in supermarkets. Catnip, toys, and veterinary bills amounted to another half-billion dollars. Money spent at last year's 97 cat shows, including expenses for housing, showing, and travel, averaged $12,000 per show—a total of more than a billion dollars.—*Cats Magazine (July, 1961)*: *2.*

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Wanted—veterinarian for Toronto area. Veterinarian for small animal practice. Ontario licensed. Send full details and photo to Dr. W. J. Stratas, 2334 Kingston Rd., Scarborough, Ont.

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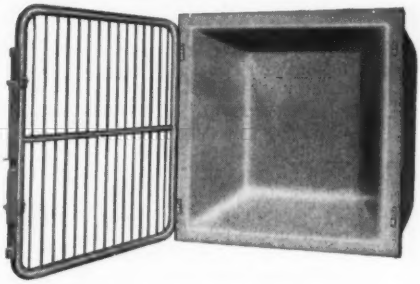

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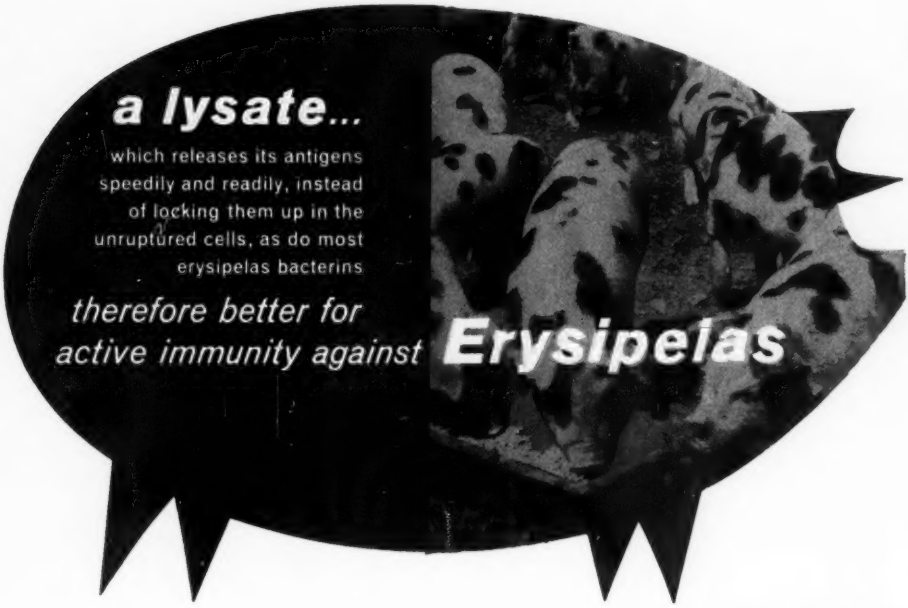
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Clinical and Research References:

1. Sinha, S. K., et al, Studies on Canine Distemper Immunization with a Tissue Culture Vaccine. Vet. Med., Vol. 55, No. 4, April 1960.
2. Burgher, J. A., et al, The Immune Response of Dogs to Distemper. Cornell Vet., Vol. 48, No. 2, 1958.
3. Paton, I. M., et al, Progress in Distemper Immunization. Jen-Sal Small Animal Topics, August 1960.
4. Dept. of Biological Research, Jensen-Salsbery Laboratories. Unpublished Research Data.

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